APPLIE
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Rochester, New York
(716) 482 - 0300 - Pho
(716) 288 - 5989 - Fax

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DRAFT

North Fork Coal

ENVIRONMENTAL IMPACT STATEMENT

North Fork Coal
ENVIRONMENTAL IMPACT STATEMENT
Delta and Gunnison Counties, Colorado
September 1999

2000-000121

FIGURES

Lead Agencies:

USDI Bureau of Land Management

USDA Forest Service

Cooperating Agency:

USDI Office of Surface Mining Reclamation & Enforcement

1

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North Fork Coal
Draft
ENVIRONMENTAL IMPACT STATEMENT

September 1999

U.S. Department of the Interior
Bureau of Land Management

U.S. Department of Agriculture
Forest Service

ENVIRONMENTAL IMPACT STATEMENT

September 1999

U.S. Department of the Interior
Bureau of Land Management
Colorado State Office
Uncompahgre Field Office

U.S. Department of Agriculture
Forest Service
Rocky Mountain Region
Grand Mesa, Uncompahgre
and Gunnison National Forest

Cooperating Agency: U.S. Department on the Interior
Office of Surface Mining Reclamation and Enforcement
Western Regional Coordinating Center

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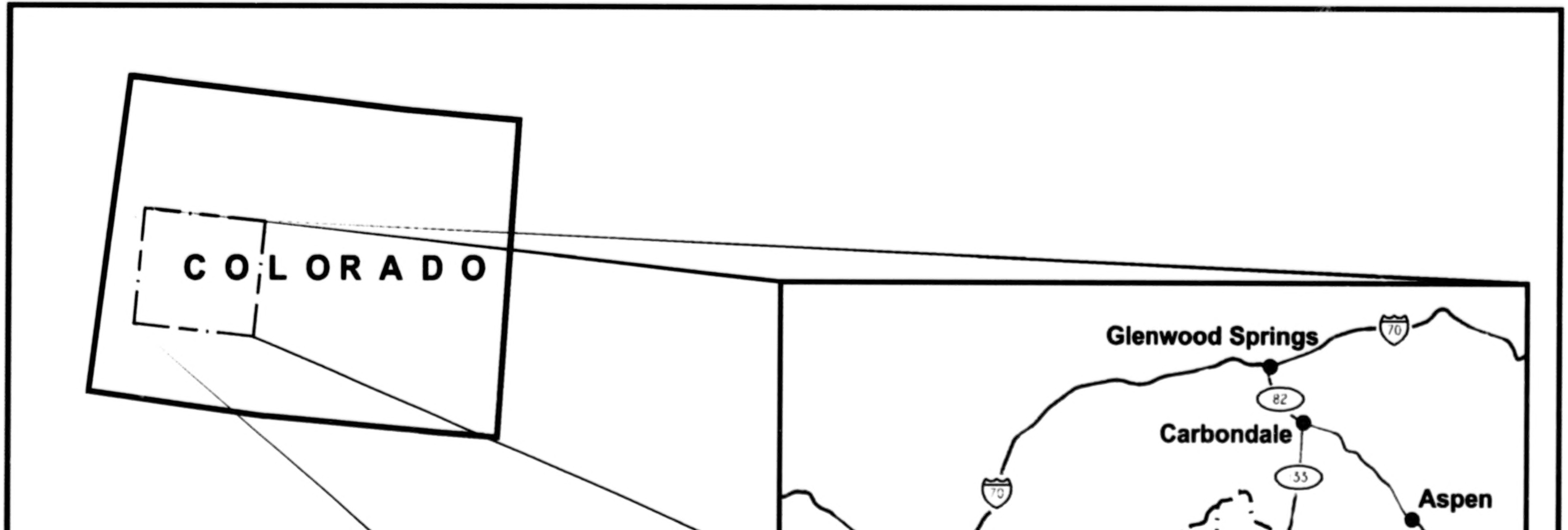
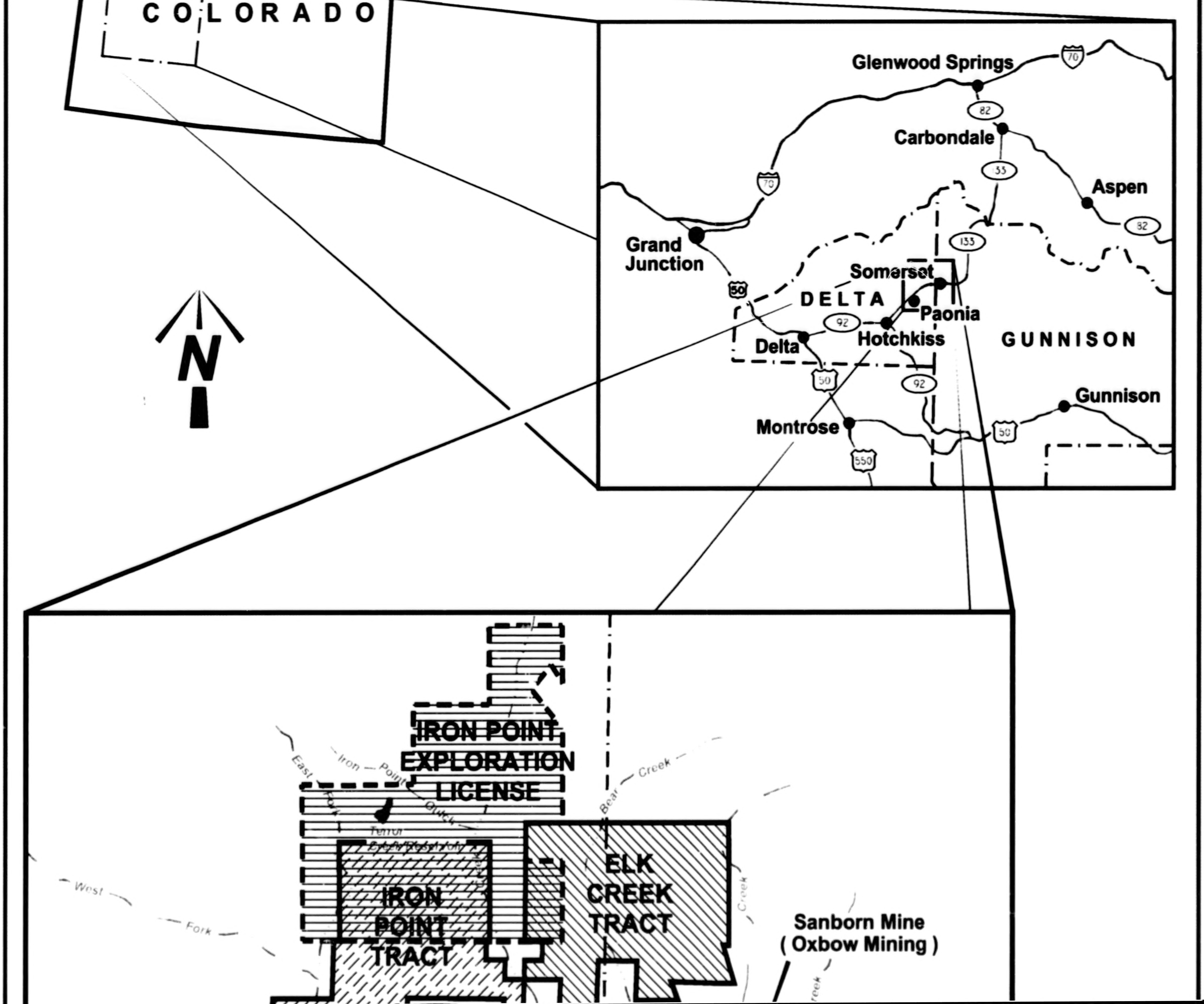
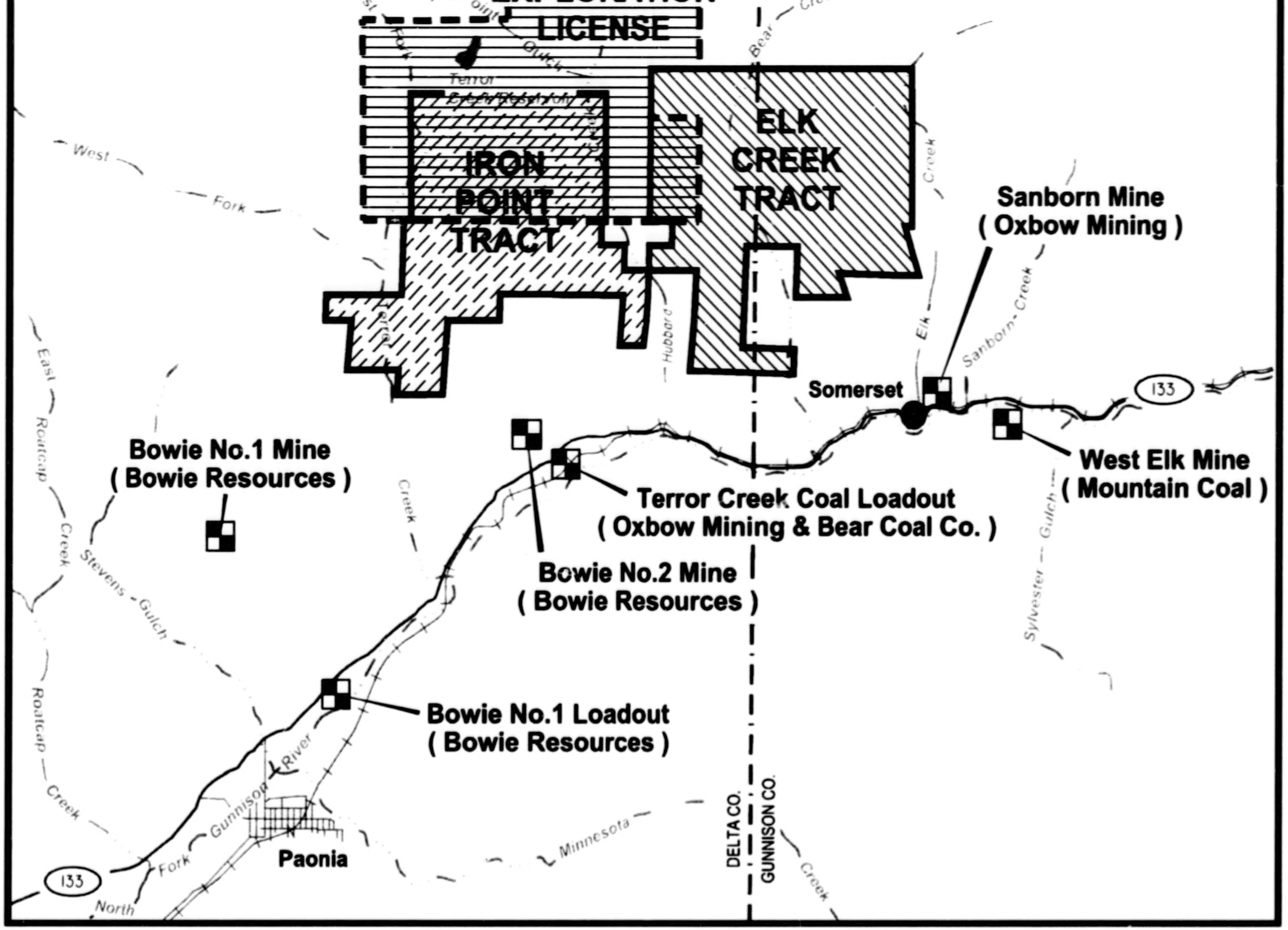

COLORADO
Glenwood Springs
70
82
Carbondale
133
Aspen
70


COLORADO
N
Glenwood Springs
70
82
Carbondale
33
Aspen
82
70
Grand Junction
133
Somerset
50
DELTA
Paonia
92
Hotchkiss
GUNNISON
Delta
50
92
Gunnison
Montrose
50
550
IRON POINT EXPLORATION LICENSE
East Fork
Iron Point Gulch
Terror Creek Reservoir
Bear Creek
Creek
West Fork
IRON POINT TRACT
ELK CREEK TRACT
Creek
Sanborn Mine (Oxbow Mining)
Creek



North Fork Coal DRAFT EIS

FIGURE 1

GENERAL LOCATION MAP

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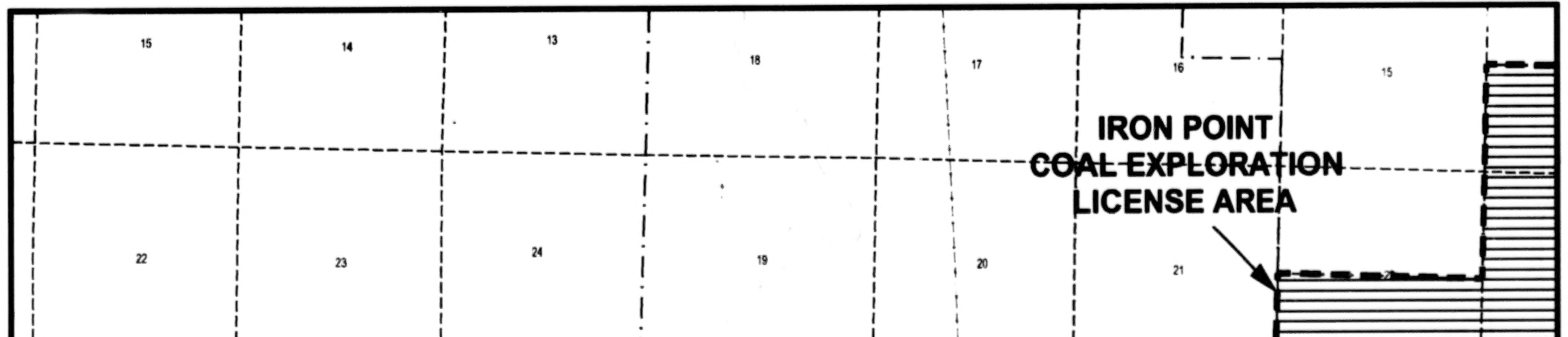

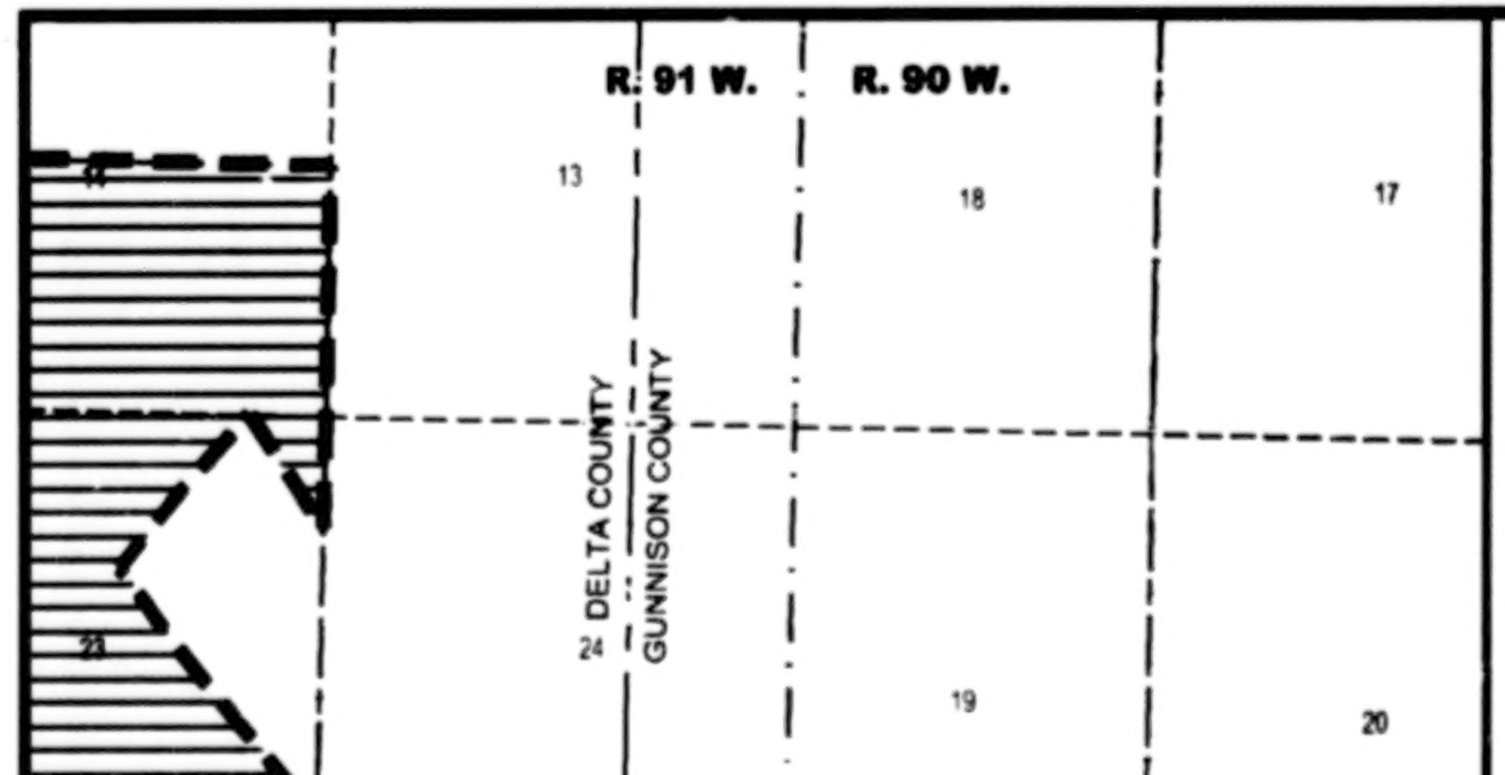

EXPLANATION

— PROPOSED COAL LEASE TRACT BOUNDARY (ELK CREEK & IRON POINT TRACTS)

- - - PROPOSED COAL EXPLORATION LICENSE BOUNDARY

SURFACE OWNERSHIP

☐ PRIVATE

NOTE:
(1). All Coal within the proposed Elk Creek and Iron Point

EXPLANATION
PROPOSED COAL LEASE TRACT BOUNDARY
(ELK CREEK & IRON POINT TRACTS)
PROPOSED COAL EXPLORATION
LICENSE BOUNDARY
SURFACE OWNERSHIP
PRIVATE
FOREST SERVICE
BUREAU OF LAND MANAGEMENT
NOTE:
(1). All Coal within the proposed Elk Creek and Iron Point Coal Lease Tracts is Federally Owned.
N
SCALE
4000'
0
4000'
IRON POINT
COAL EXPLORATION
LICENSE AREA
Iron Point
IRON POINT
COAL LEASE TRACT
BOWIE No.2 MINE
PORTAL AREA
Morrell
Cow Camp
ELK CREEK
COAL LEASE TRACT
OXBOW SURFACE
FACILITIES
Radio
Tower
DELTA COUNTY
GUNNISON COUNTY
T.
12
S.
T.
13
S.
R. 90 W.
R. 89 W.
22
23
24
19
20
21
27
26
25
30
28
34
35
36
31
33
32
3
2
1
6
5
4
10
11
12
7
9
8
13
18
17
24
19
20
25
30
29
36
31
32
33
34
35
36
5
4
3
2
1
7
8
9
10
11
12

North Fork Coal DRAFT EIS

FIGURE 2

SURFACE OWNERSHIP

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North Fork Coal DRAFT EIS

FIGURE 2
SURFACE OWNERSHIP

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15
14
13
18
17
16
15
IRON POINT
COAL EXPLORATION
LICENSE AREA
22
23
24
19
20
21
R. 91 W.
R. 90 W.
13
18
17
DELTA COUNTY
GUNNISON COUNTY
24
19
20
EXPLANATION
PROPOSED COAL LEASE TRACT BOUNDARY
(ELK CREEK & IRON POINT TRACTS)
PROPOSED COAL EXPLORATION
LICENSE BOUNDARY
C-54558
FEDERAL COAL LEASE BOUNDARY
AND LEASE IDENTIFICATION
MINED B SEAM
NOTE:
(1). Some coal has been historically mined on the Iron Point and Elk Creek Coal Lease Tracts. This mining occurred under past leasing arrangements no longer in force.

IRON POINT
COAL EXPLORATION
LICENSE AREA
IRON POINT
COAL LEASE TRACT
ELK CREEK
COAL LEASE TRACT
PROPOSED COAL LEASE TRACT BOUNDARY
(ELK CREEK & IRON POINT TRACTS)
PROPOSED COAL EXPLORATION
LICENSE BOUNDARY
C-54558
FEDERAL COAL LEASE BOUNDARY
AND LEASE IDENTIFICATION
MINED B SEAM
MINED C SEAM
MINED D SEAM
MINED E SEAM
MINED F SEAM
NOTE:
(1). Some coal has been historically mined on the Iron Point and Elk Creek Coal Lease Tracts. This mining occurred under past leasing arrangements no longer in force.
N
SCALE
4000'
0
4000'
DELTA COUNTY
GUNNISON COUNTY
Iron Point
T. 12 S.
T. 13 S.
R. 90 W.
R. 89 W.
Morrell Cow Camp
Blue Ribbon
USS Steel
C-53356
C-37210
Bowie No. 1
C-27432
Bowie No. 2
Kingmine
Bowie
Juanita Junction
Hawksnest
C-53510
Oxbow
Oxbow
USS Steel
Radio Tower
Oliver No.1
C-56447
Edwards
Bear No. 1&2

North Fork Coal DRAFT EIS

FIGURE 3
HISTORIC COAL MINES
AND FEDERAL COAL LEASE LOCATIONS

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17
16
15
14
IP99-21
13
DELTA COUNTY
GUNNISON COUNTY
R. 91 W.
R. 90 W.
18
EXPLANATION
PROPOSED IRON POINT COAL EXPLORATION LICENSES BOUNDARY
IP99-1
PROPOSED DRILL HOLE (Federal Surface)
HC99-3
PROPOSED DRILL HOLE (Private Surface)
PROPOSED EXPLORATION ACCESS (Existing Roads)
NEW ACCESS ROAD (

EXPLANATION

▪ ▪ ▪ ▪	PROPOSED IRON POINT COAL EXPLORATION LICENSES BOUNDARY
IP99-1 ●	PROPOSED DRILL HOLE (Federal Surface)
HC99-3 ●	PROPOSED DRILL HOLE (Private Surface)
— —	PROPOSED EXPLORATION ACCESS (Existing Roads)
▪ ▪ ▪ ▪	NEW ACCESS ROAD (Temporary)

NOTE:

(1). Drilling Activities must occur within 2 year period.

(2). All Drilling must comply with Forest Service / BLM stipulations.

(3). Reclamation of drill sites and new road access is required.

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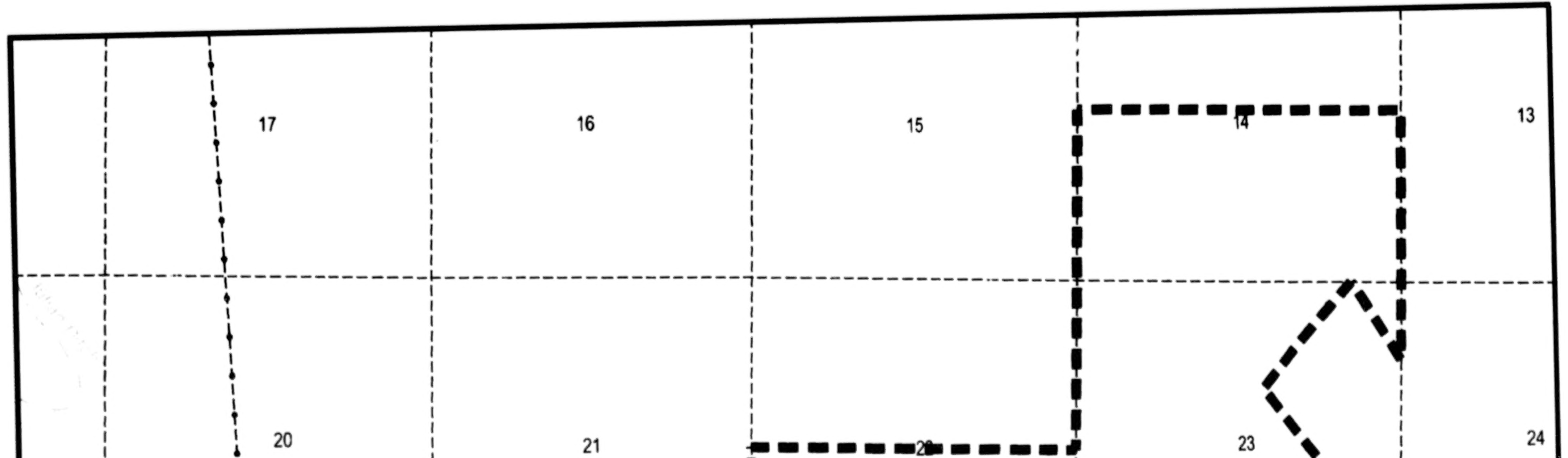
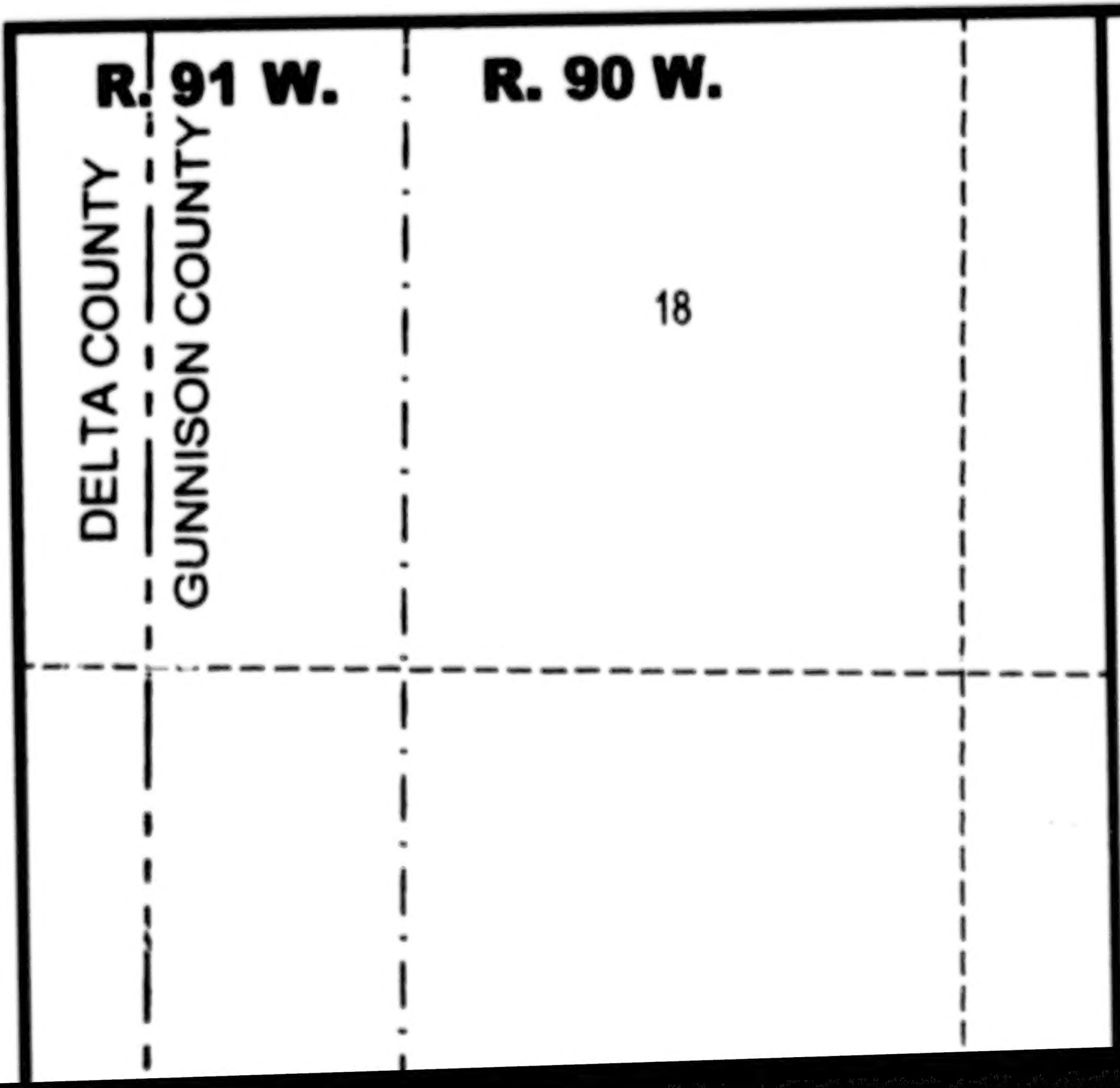
North Fork Coal DRAFT EIS

FIGURE 4

IRON POINT EXPLORATION LICENSE PLAN

7





EXPLANATION

━━ PROPOSED COAL LEASE TRACT BOUNDARY
(ELK CREEK & IRON POINT TRACTS)

- - - PROPOSED COAL EXPLORATION
LICENSE BOUNDARY

▨ IRON POINT COAL LEASE TRACT

▧ ELK CREEK COAL LEASE TRACT

▬ POWERLINE PROTECTION ZONE
(SEE NOTE No.1)

NOTE:
(1). No mining - related surface disturbance allowed within 100 feet of the outside of the powerline right-of-way, which is 125 feet wide. See Criterion No.2 in Appendix C, Unsuitability Analysis Report - Iron Point Coal Lease Tract.

LICENSE BOUNDARY
IRON POINT COAL LEASE TRACT
ELK CREEK COAL LEASE TRACT
POWERLINE PROTECTION ZONE
(SEE NOTE No.1)
N
SCALE
2000'
0
2000'
CONTOUR INTERVAL 200FT.
Report - Iron Point Coal Lease Tract.
DEL
GUNNI
20
21
22
23
24
19
29
28
27
Iron
Point
26
25
30
29
28
27
26
BUCK
MESA
Springhouse
Park
Bull
Park
Cottonwood
Stom
32
33
34
Dove
Gulch
Sheep
Corral
35
36
31
Elk
Mountain
32
33
34
35
Thousand Acre
Flats
T.
12
S.

North Fork Coal DRAFT EIS

FIGURE 5

ALTERNATIVE B

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EXPLANATION

—	PROPOSED COAL LEASE TRACT BOUNDARY (ELK CREEK & IRON POINT TRACTS)
- - -	PROPOSED COAL EXPLORATION LICENSE BOUNDARY
▨	IRON POINT COAL LEASE TRACT
▧	ELK CREEK COAL LEASE TRACT

NOTE:

(1). No mining - related surface disturbance allowed within 100 feet of the outside of the powerline right-of-way, which is 125 feet wide. See Criterion No.2 in Appendix C. Unsuitability Analysis Report - Iron Point Coal Lease Tract.

NOTE:
(1). No mining - related surface disturbance allowed within 100 feet of the outside of the powerline right-of-way, which is 125 feet wide. See Criterion No.2 in Appendix C. Unsuitability Analysis Report - Iron Point Coal Lease Tract.

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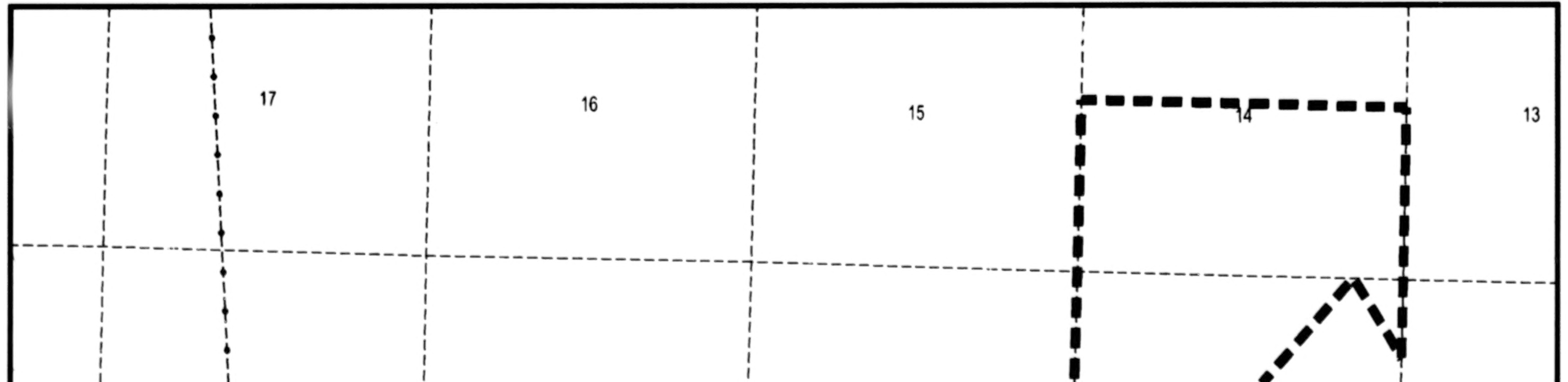
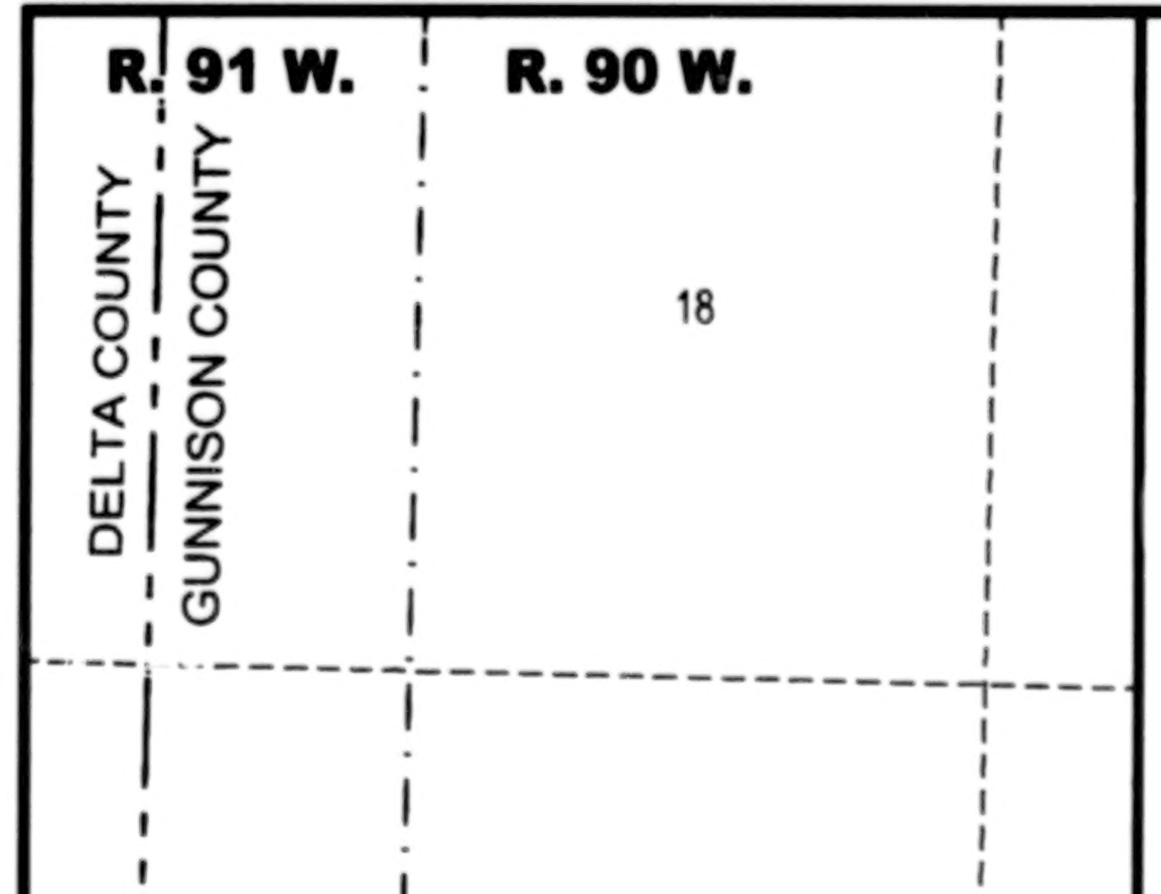
North Fork Coal DRAFT EIS

FIGURE 6

ALTERNATIVE C





EXPLANATION

— PROPOSED COAL LEASE TRACT BOUNDARY (ELK CREEK & IRON POINT TRACTS)

- - - PROPOSED COAL EXPLORATION LICENSE BOUNDARY

▨ IRON POINT COAL LEASE TRACT

▨ ELK CREEK COAL LEASE TRACT

░ SUBSIDENCE PROTECTION ZONE

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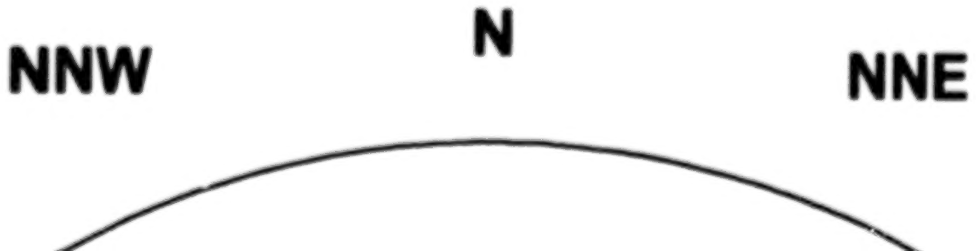
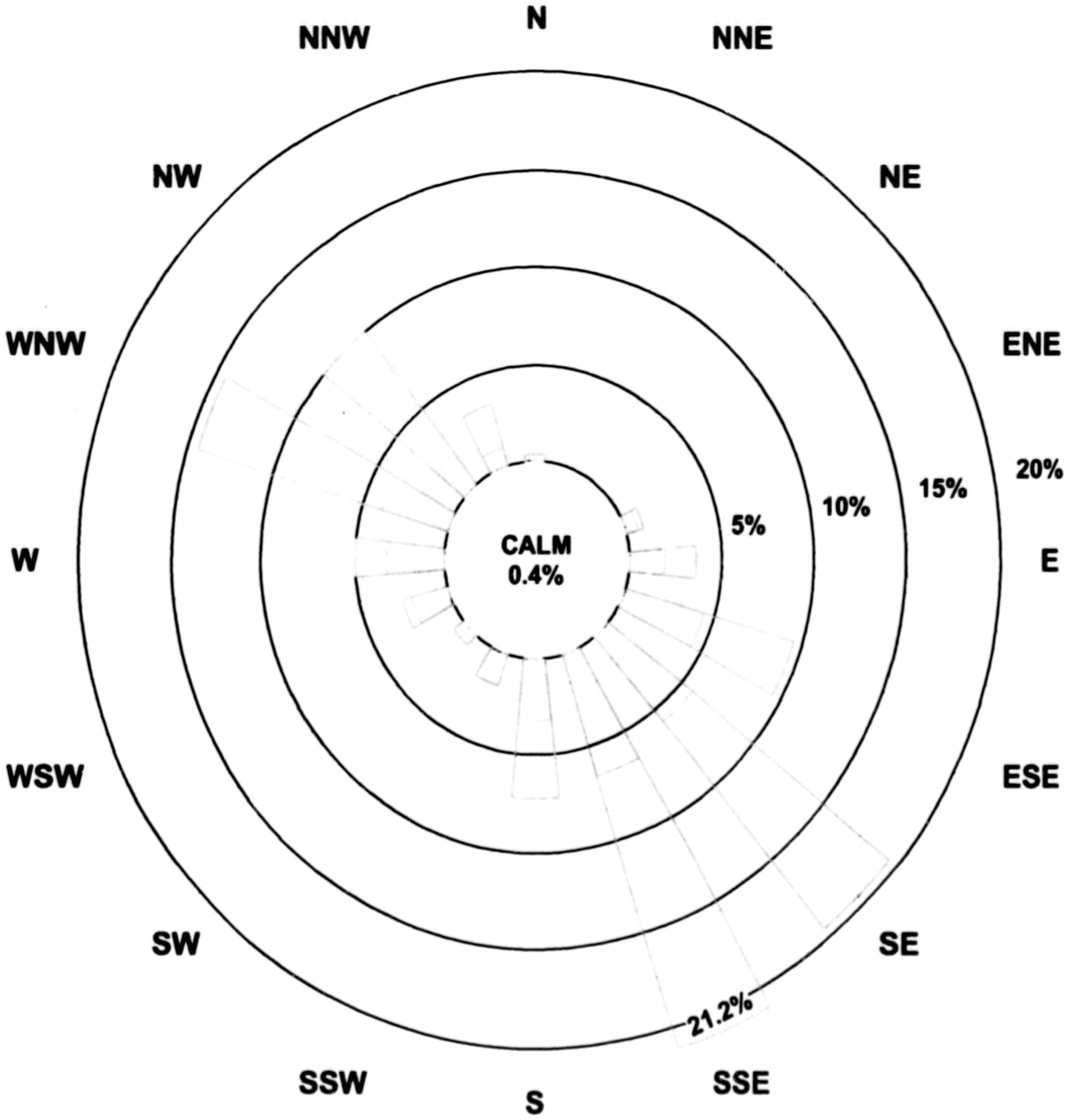
North Fork Coal DRAFT EIS

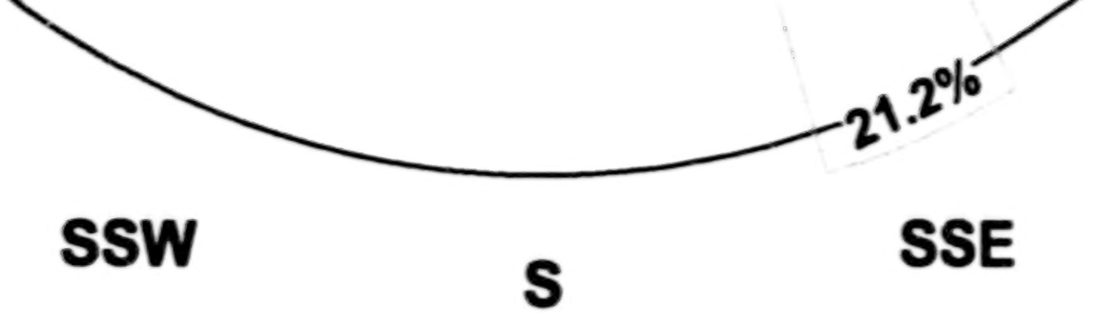
FIGURE 7
ALTERNATIVE D


NNW
N
NNE



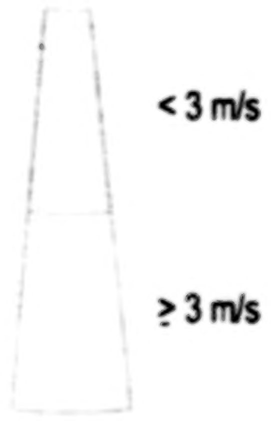
AVERAGE WIND SPEED = 3.6 m/s

EXPLANATION



AVERAGE WIND SPEED = 3.6 m/s

EXPLANATION



CALMS ARE WINDS WITH
SPEEDS LESS THAN 0.44 m/s
SHOWN AS DIRECTION FROM WHICH WIND IS BLOWING

NOTE:
(1). From West Elk Mine in Gunnison County, Colorado
(2). Data Taken March 1987 through August 1987
(3). SOURCE: Air Sciences Inc. of Lakewood, Colorado

North Fork Coal DRAFT EIS
FIGURE 8
WIND ROSE FOR WEST ELK MINE

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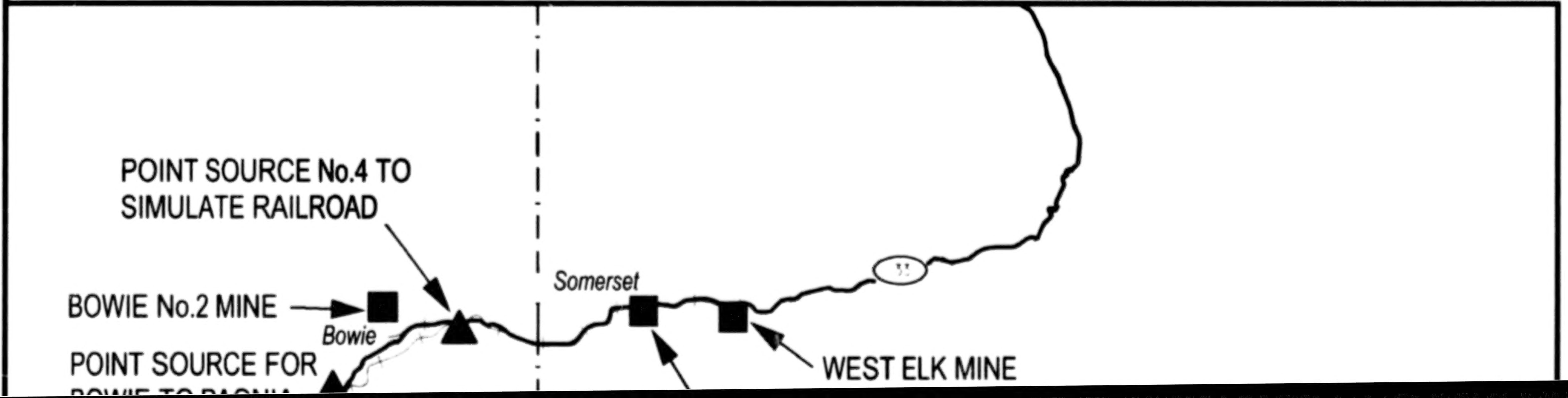
POINT SOURCE No.4 TO SIMULATE RAILROAD
BOWIE No.2 MINE
Bowie
POINT SOURCE FOR
Somerset
WEST ELK MINE

All Rights

POINT SOURCE NO.1 TO SIMULATE RAILROAD
POINT SOURCE No.2 TO SIMULATE RAILROAD
Hotchkiss
Union Pacific Railroad
92
33
Delta
POINT SOURCE No.4 TO SIMULATE RAILROAD
BOWIE No.2 MINE
Bowie
POINT SOURCE FOR BOWIE TO PAONIA HAUL ROAD
BOWIE No.1 LOADOUT
Paonia
POINT SOURCE No.3 TO SIMULATE RAILROAD
Somerset
33
WEST ELK MINE
SANBORN CREEK MINE
WEST ELK RECEPTOR (Mt. Gunnison)
SOUTH GOLDEN LAKE
WEST ELK WILDERNESS
92
DELTA COUNTY
MONTROSE COUNTY
GUNNISON COUNTY

EXPLANATION

IRON POINT COAL LEASE TRACT

ELK CREEK COAL LEASE TRACT

▲ POINT SOURCE LOCATION

SCALE
12,000' 0 12,000'

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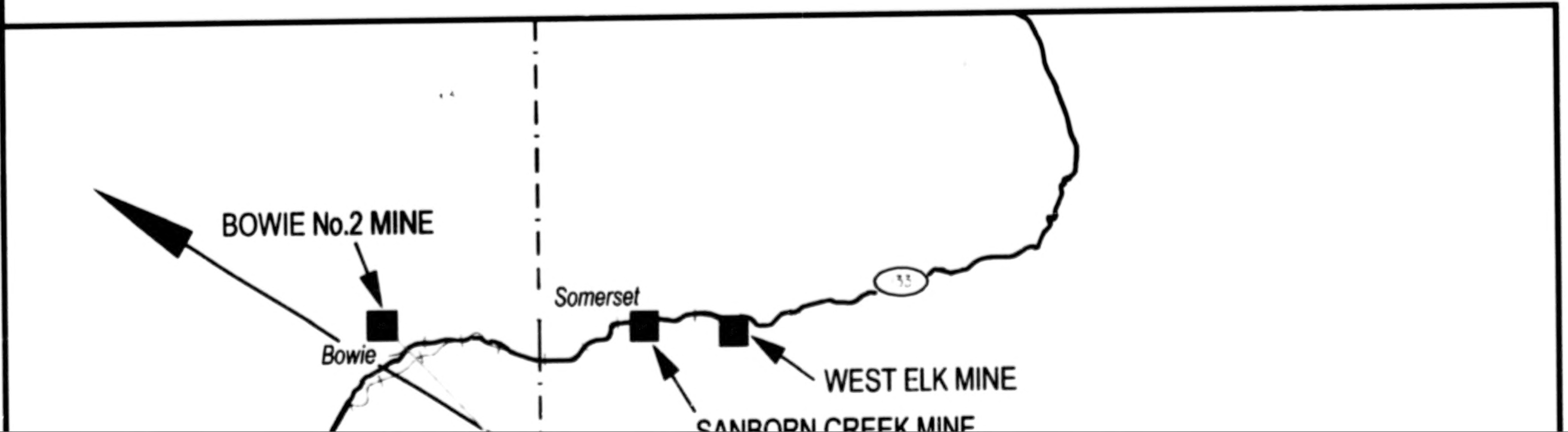
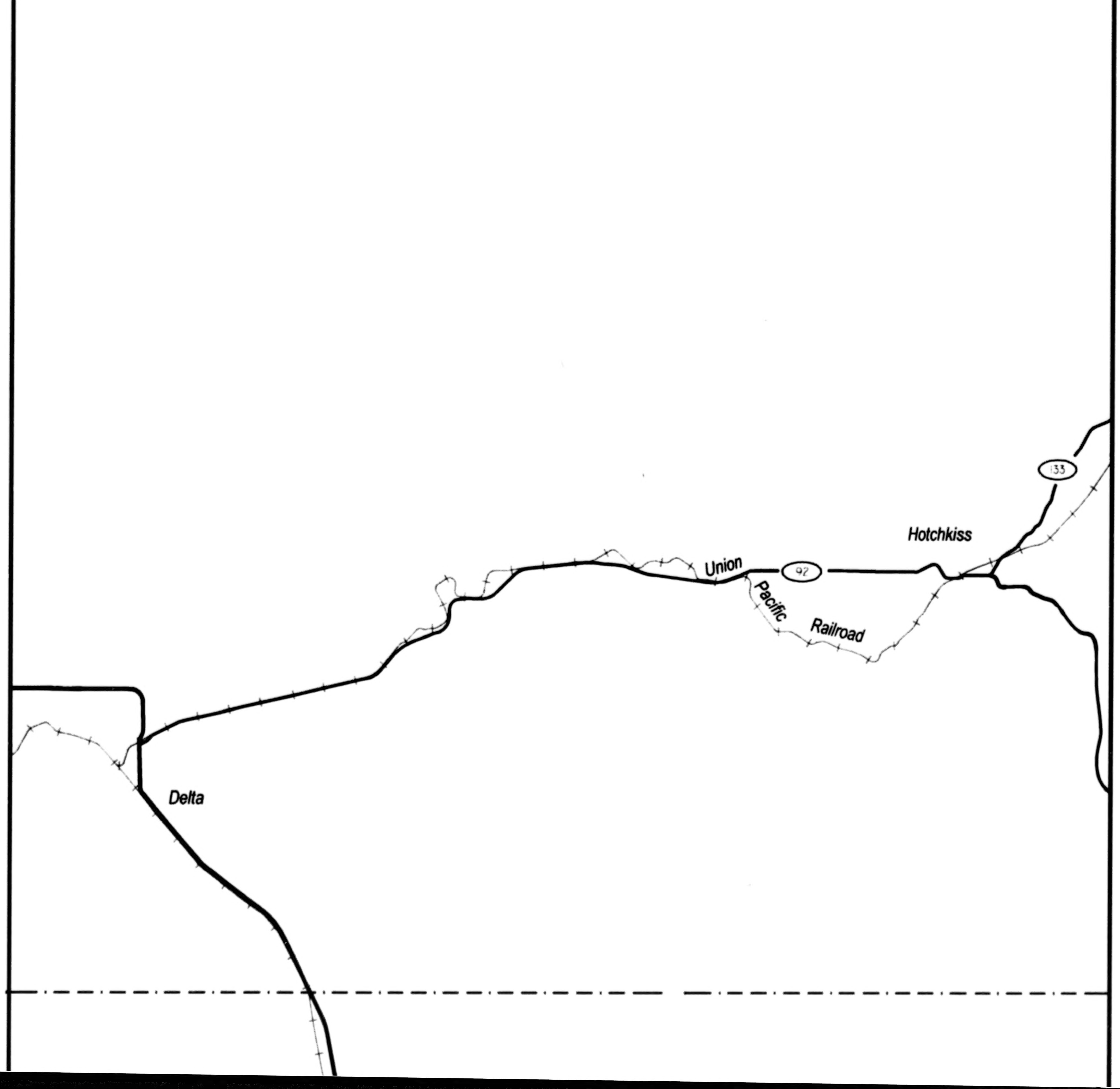
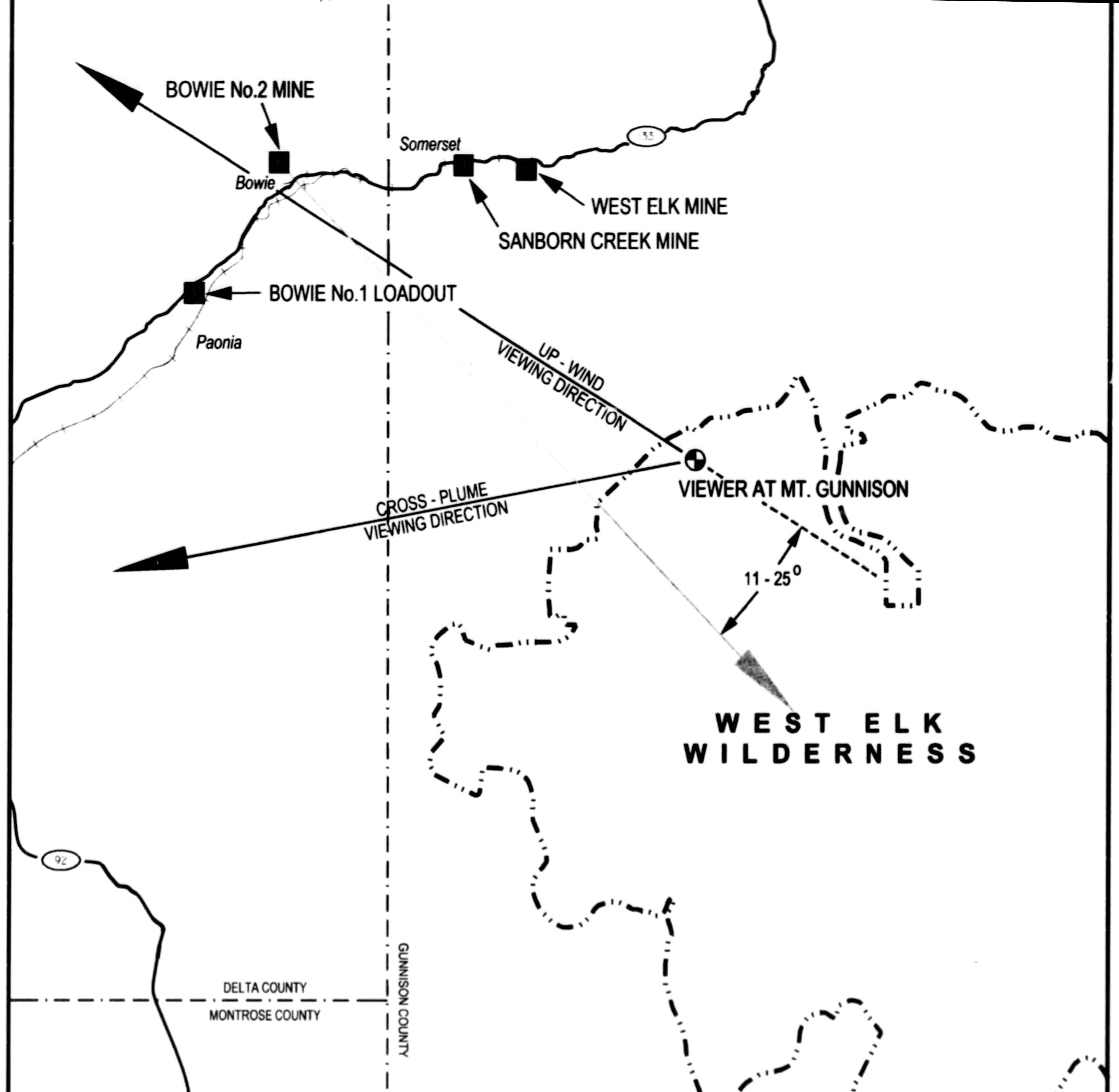
North Fork Coal DRAFT EIS

FIGURE 9
EMISSION SOURCES AND WILDERNESS AREA RECEPTORS FOR VISIBILITY AND ACID DEPOSITION MODELING


BOWIE No.2 MINE
Somerset
Bowie
WEST ELK MINE
SANBORN CREEK MINE


133
Hotchkiss
Union
92
Pacific
Railroad
Delta


BOWIE No.2 MINE
Somerset
133
Bowie
WEST ELK MINE
SANBORN CREEK MINE
BOWIE No.1 LOADOUT
Paonia
UP - WIND VIEWING DIRECTION
VIEWER AT MT. GUNNISON
CROSS - PLUME VIEWING DIRECTION
11 - 25°
WEST ELK WILDERNESS
92
DELTA COUNTY
MONTROSE COUNTY
GUNNISON COUNTY

North Fork Coal DRAFT EIS

FIGURE 10

EMISSION SOURCES AND VIEWER FOR PLUVUE MODELING

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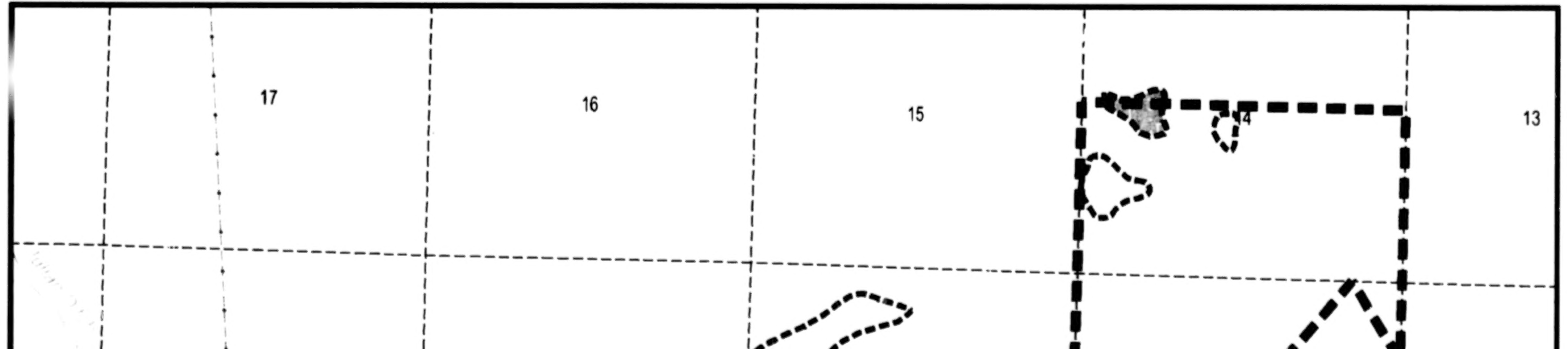

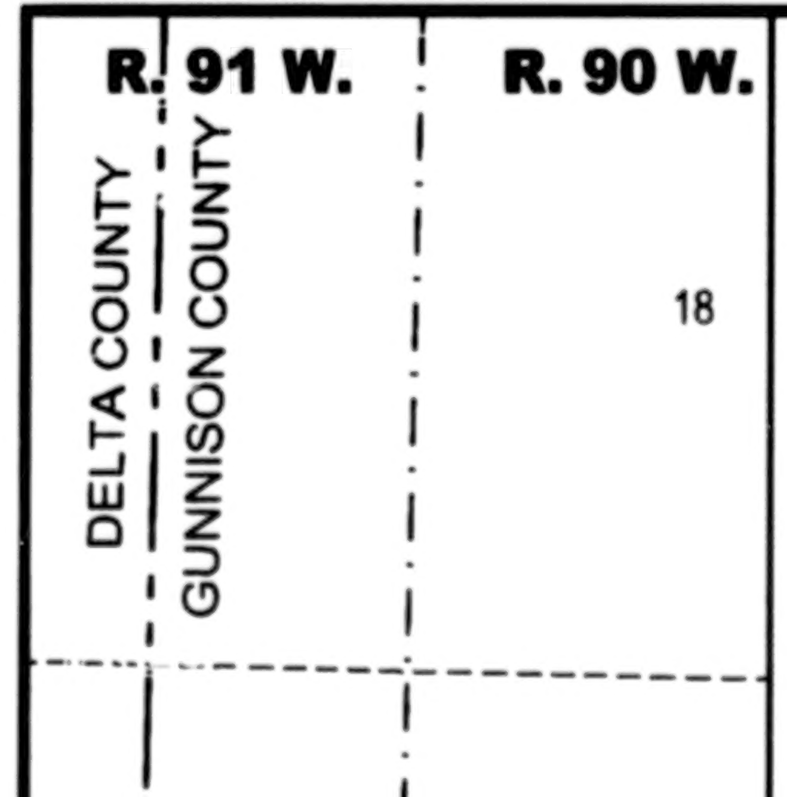

EXPLANATION

▬▬▬	PROPOSED COAL LEASE TRACT BOUNDARY (ELK CREEK & IRON POINT TRACTS)
■ ■ ■ ■	PROPOSED COAL EXPLORATION LICENSE BOUNDARY

GEOLOGIC HAZARD CLASSIFICATIONS

▨ LANDSLIDE: Includes mostly landslides that have moved in the last few centuries, decades or years, but also may include local, quasi-stable areas and some colluvium. Unit also includes earthflows, mudflows, debris avalanches, debris fans, and slope failure complex (combinations of some or all of the above). Rockfalls may occur in the upper part of the slide, particularly where head scarps occur. The lower part of the slide (toe zone) may contain areas of accumulations of rocks or contain closed depressions that hold water and are subject to hydrocompaction and swelling and shrinking

PROPOSED COAL LEASE TRACT BOUNDARY
(ELK CREEK & IRON POINT TRACTS)

PROPOSED COAL EXPLORATION
LICENSE BOUNDARY

GEOLOGIC HAZARD CLASSIFICATIONS

▨ LANDSLIDE: Includes mostly landslides that have moved in the last few centuries, decades or years, but also may include local, quasi-stable areas and some colluvium. Unit also includes earthflows, mudflows, debris avalanches, debris fans, and slope failure complex (combinations of some or all of the above). Rockfalls may occur in the upper part of the slide, particularly where head scarps occur. The lower part of the slide (toe zone) may contain areas of accumulations of rocks or contain closed depressions that hold water and are subject to hydrocompaction and swelling and shrinking of any expansive claystones present.

■ LANDSLIDE 1: Same as LANDSLIDE, except extensive movement has occurred on a pre-existing slide, or a new slide has formed, during last 25 years.

☐ ROCKFALL: An area, usually on a slope greater than 50-60%, that is subject to intermittent, unpredictable falling, rolling, sliding of detached bedrock from a cliff or ledge, commonly along joint faces or joint intersections. Area of unit includes the rock accumulation zone near its base.

☐ UNSTABLE SLOPE: An area where some type of mass-gravity movement has likely occurred in the past, and where more movement is likely, particularly when highly saturated and / or disturbed. Includes local areas of potentially unstable slopes, soil creep, landslides, debris fans, rockfalls, earthflows and mudflows.

NOTE:

(1). Geologic hazard units are mapped in accordance with State of Colorado House Bill 1041 (C.R.S. 1973, 24-65.1-101, st. seq.). For the purpose of this EIS document, some of the geologic hazard map units, as defined by the State of Colorado (EXH-12) have been combined. Geologic hazard map units described by Fehlmann (6-19-91) were also noted and compared.

(2). MAPPING methods: The map units were mapped on portions of the Bowie, Somerset, and Electric Mountain USGS 7 1/2 - minute Quadrangle Maps. Map unit boundaries, which should be considered as transitional to adjacent units, were drawn using stereographic pairs of aerial photographs dateed 7-1-89 and 10-6-97. These units were also mapped using the author's knowledge from previous mapping of the area (Dunrud, C.R., 1989).

North Fork Coal DRAFT EIS
FIGURE 11
GEOLOGIC HAZARDS MAP

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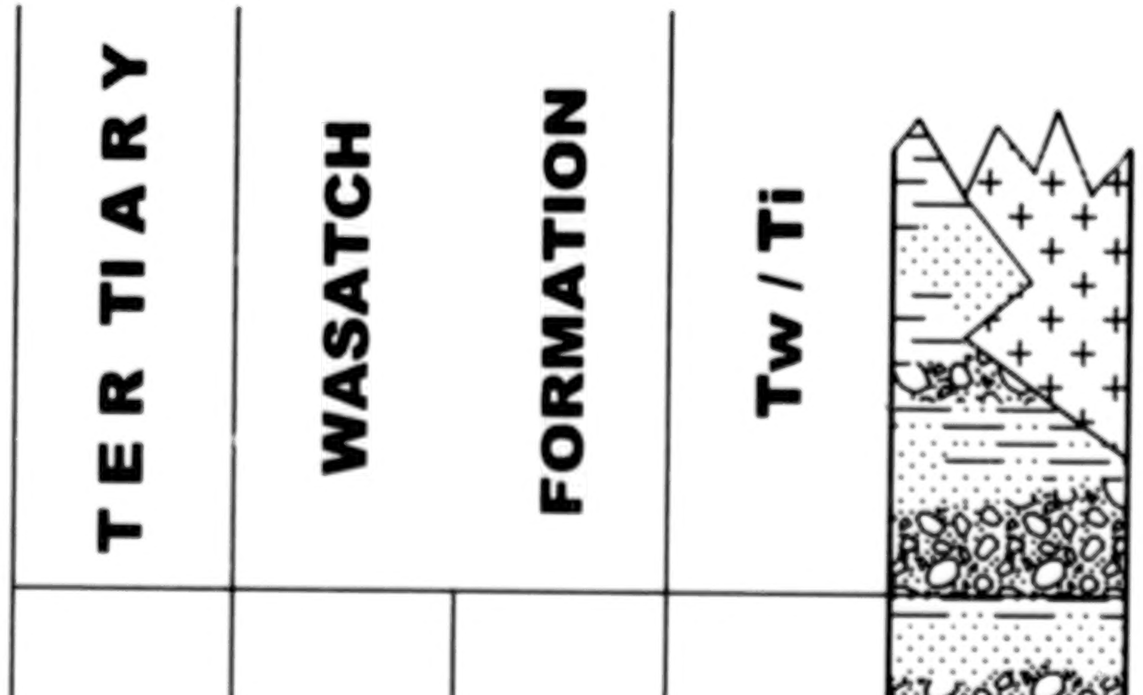
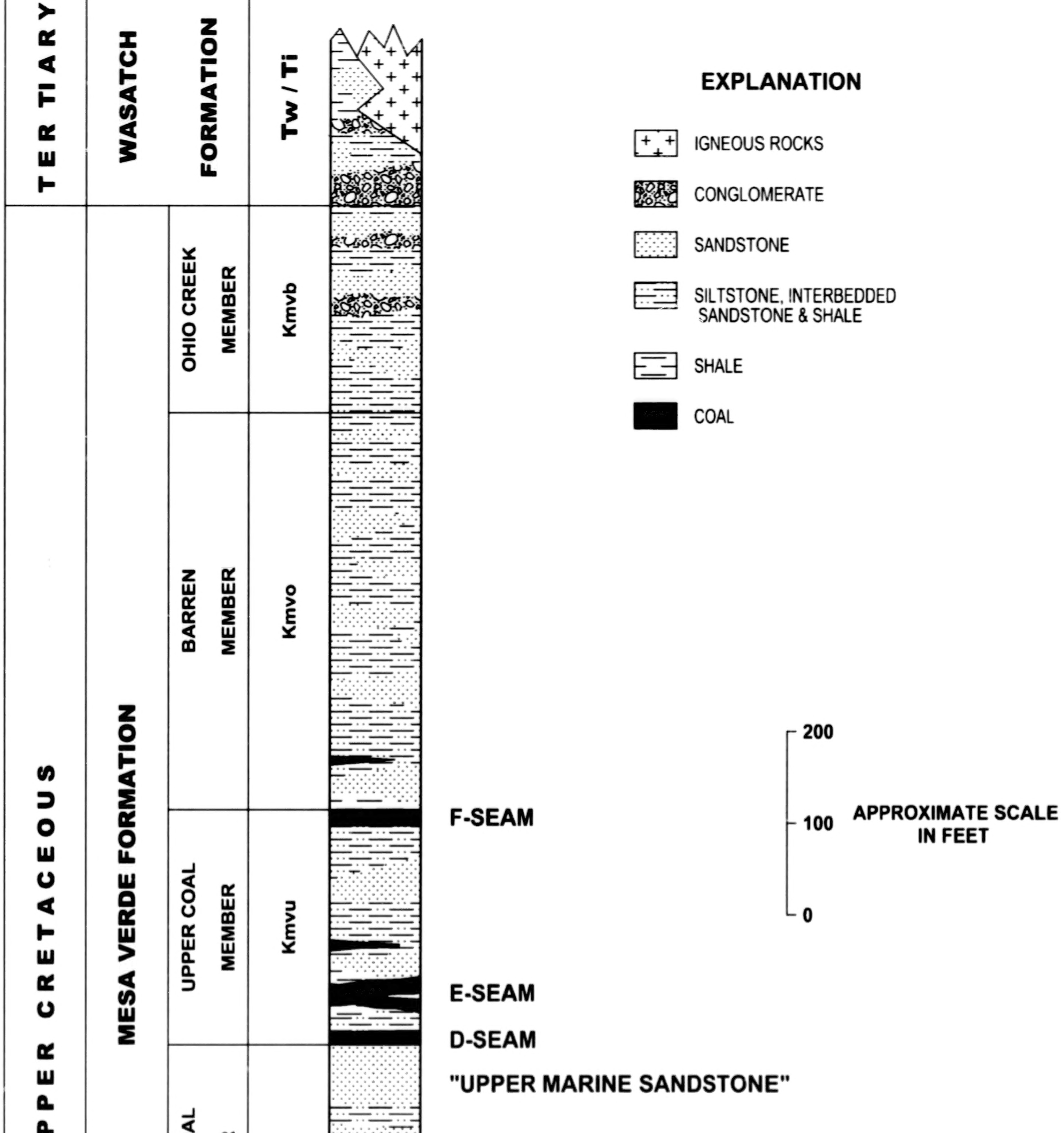
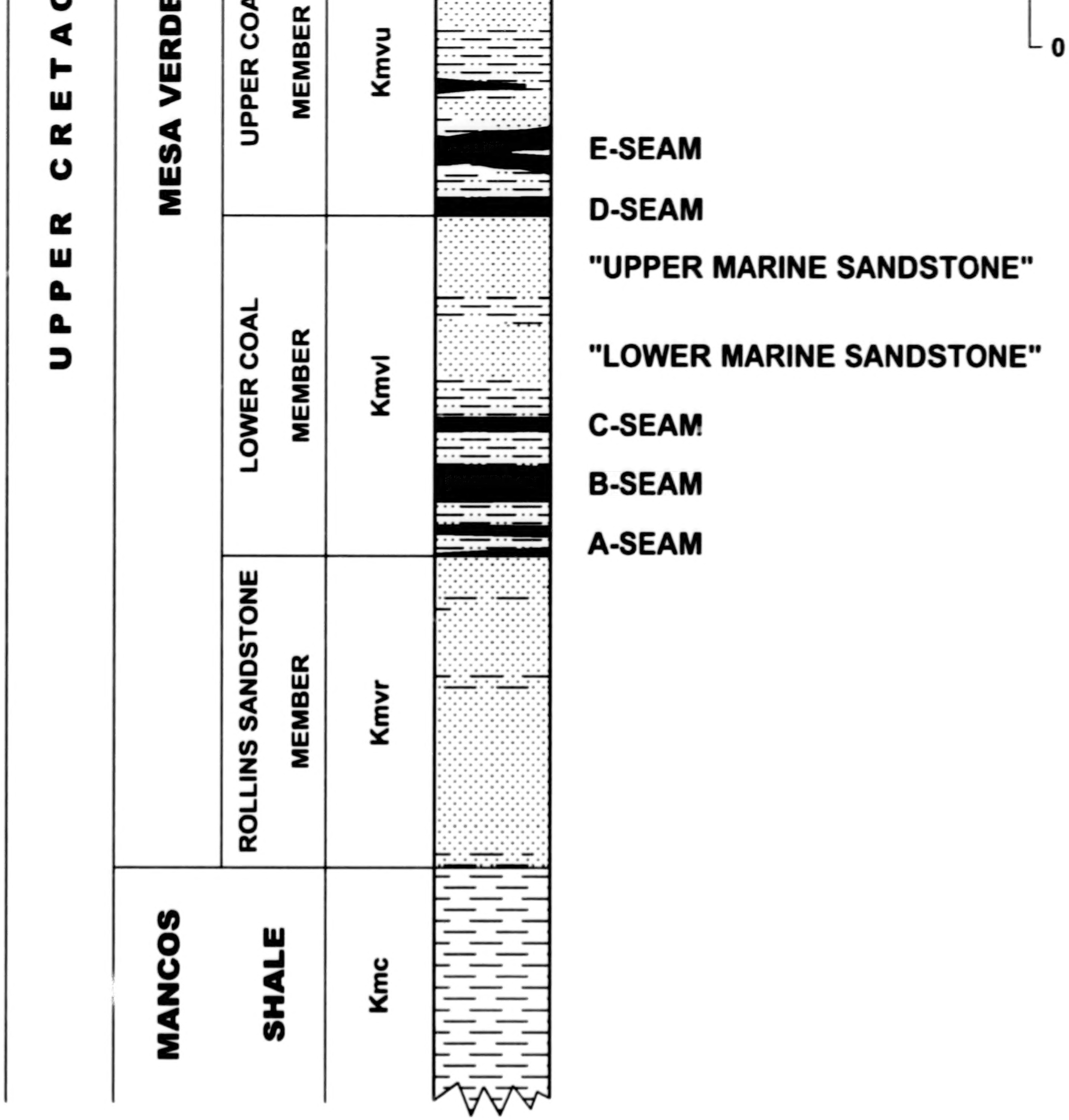


EXPLANATION

- ➕ IGNEOUS ROCKS
- ▨ CONGLOMERATE


TERTIARY
WASATCH
FORMATION
Tw / Ti
PPER CRETACEOUS
MESA VERDE FORMATION
OHIO CREEK MEMBER
Kmvb
BARREN MEMBER
Kmvo
UPPER COAL MEMBER
Kmvu
AL
F-SEAM
E-SEAM
D-SEAM
"UPPER MARINE SANDSTONE"
EXPLANATION
IGNEOUS ROCKS
CONGLOMERATE
SANDSTONE
SILTSTONE, INTERBEDDED SANDSTONE & SHALE
SHALE
COAL
200
100
0
APPROXIMATE SCALE IN FEET



North Fork Coal DRAFT EIS

FIGURE 12
TYPICAL GEOLOGIC CROSS-SECTION

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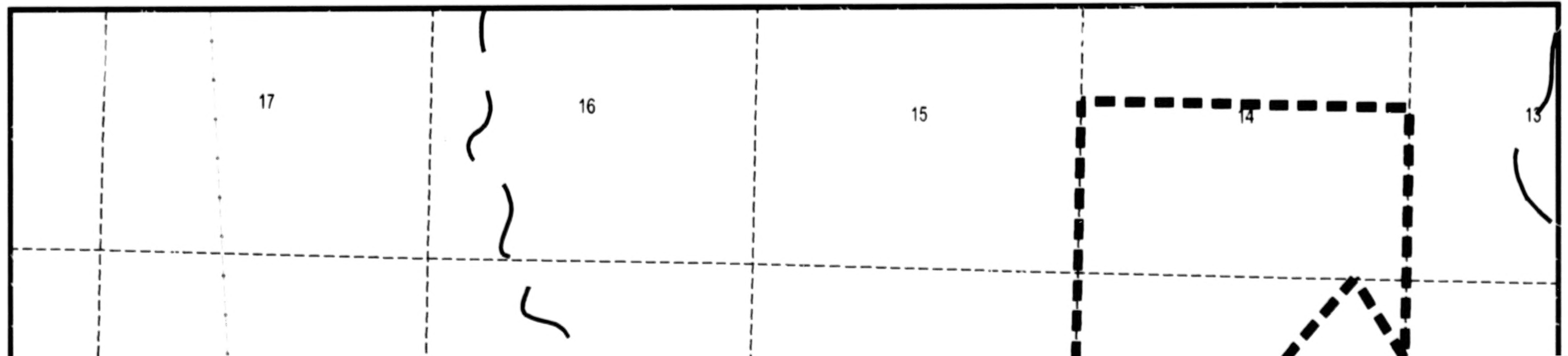

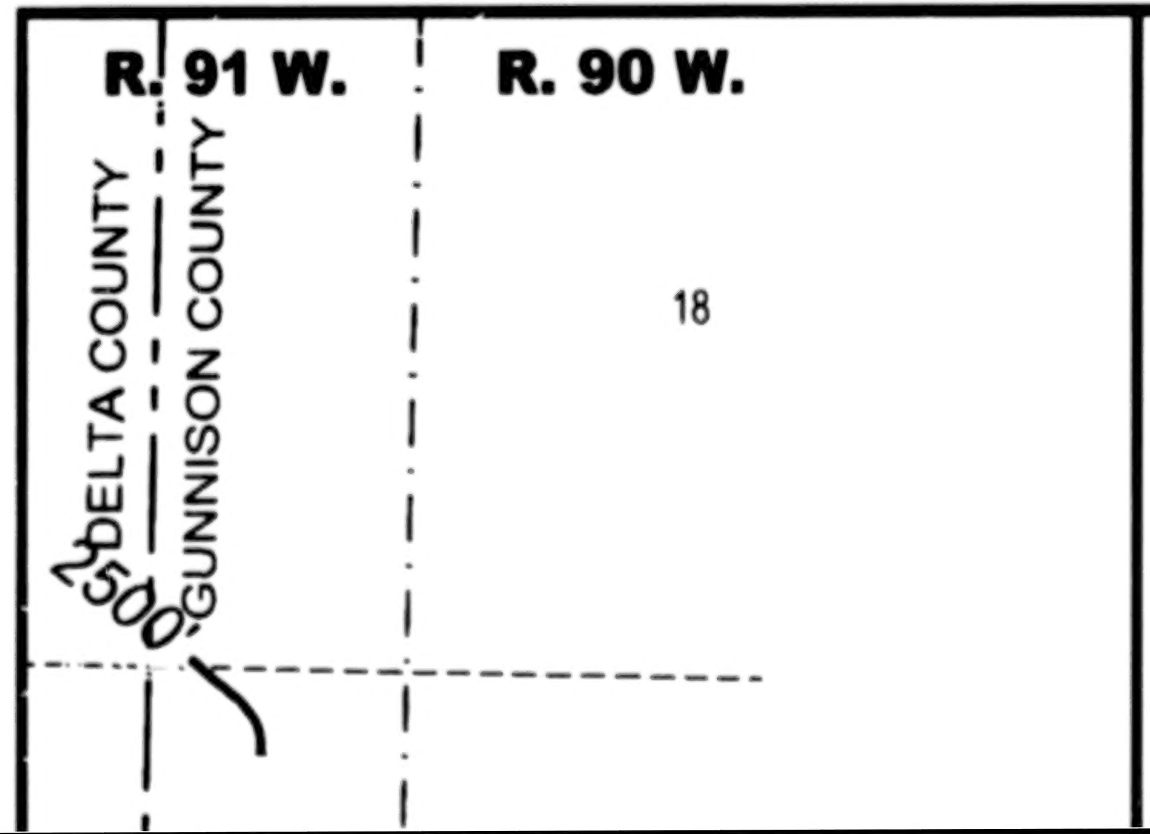

EXPLANATION

—— PROPOSED COAL LEASE TRACT BOUNDARY (ELK CREEK & IRON POINT TRACTS)

■ ■ ■ ■ PROPOSED COAL EXPLORATION LICENSE BOUNDARY

COAL OUTCROP LIMIT

– – – · BURNED COAL LIMIT

— — OVERBURDEN ISOPACH CONTOUR

☐ BURN LIMIT TO 500' OVERBURDEN

☐ 500' TO 1000' OVERBURDEN

☐ 1000' TO 1500' OVERBURDEN

☐ 1500' TO 2000' OVERBURDEN

PROPOSED COAL LEASE TRACT BOUNDARY (ELK CREEK & IRON POINT TRACTS)
PROPOSED COAL EXPLORATION LICENSE BOUNDARY
COAL OUTCROP LIMIT
BURNED COAL LIMIT
OVERBURDEN ISOPACH CONTOUR
BURN LIMIT TO 500' OVERBURDEN
500' TO 1000' OVERBURDEN
1000' TO 1500' OVERBURDEN
1500' TO 2000' OVERBURDEN
2000' TO 2500' OVERBURDEN
N
SCALE
2000'
0
2000'
CONTOUR INTERVAL 200FT
NOTE:
(1) Data reflects best available information
DELTA COUNTY
GUNNISON COUN
2500'
2000'
1500'
Iron Point
Cottonwood Stomp
Fire Mountain
T. 12
17
16
15
14
13
20
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32
33
34
35

North Fork Coal DRAFT EIS

FIGURE 13

D-SEAM OVERBURDEN ISOPACH

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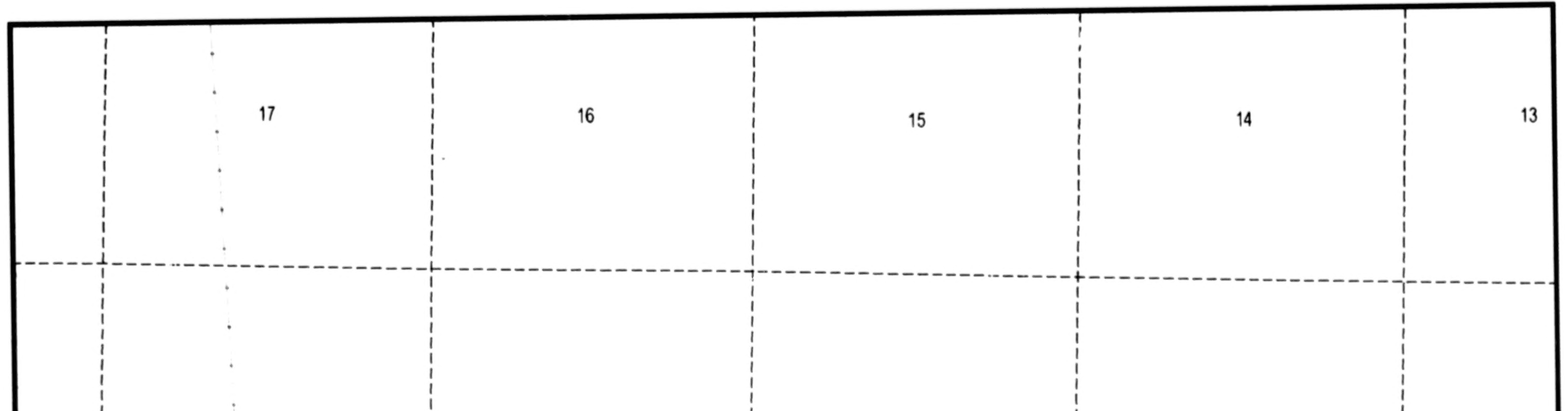

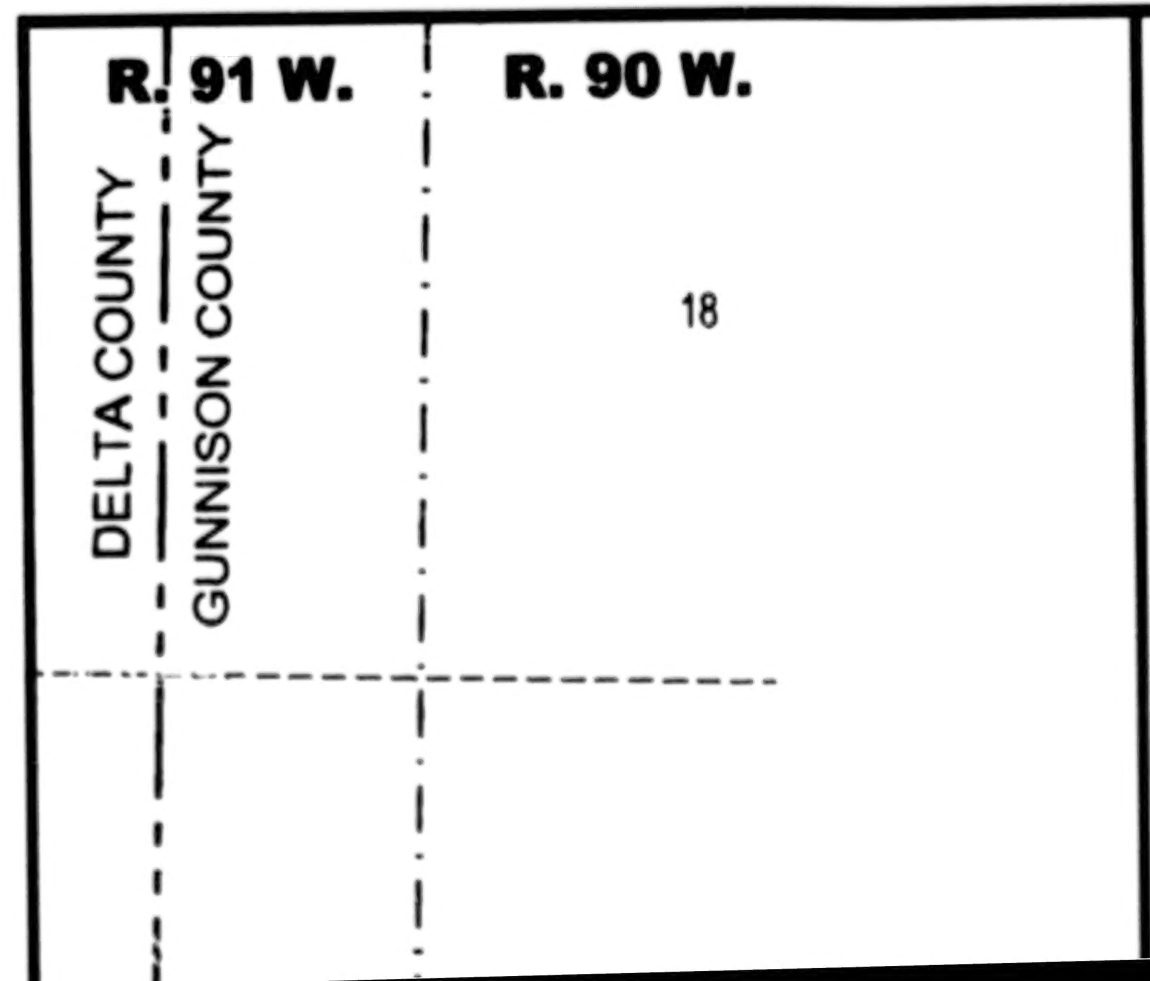

EXPLANATION

- ━ PROPOSED COAL LEASE TRACT BOUNDARY (ELK CREEK & IRON POINT TRACTS)
- ─ D-SEAM BURN LIMIT
- ■■■■■■■ AREA OF POTENTIAL SUBSIDENCE (BASED ON MINING THE ENTIRE LEASE COAL RESOURCE - USING A 21 DEGREE ANGLE OF DRAW)
- ● DH-13 GROUND WATER WELL
- ▲ *S2-7* SPRING
- ▲ SPRING WITH POND
- ▩ HIGH TO VERY HIGH POTENTIAL SUBSIDENCE
- ☐ MODERATE TO HIGH POTENTIAL SUBSIDENCE
- ☐ LOW TO MODERATE POTENTIAL SUBSIDENCE
- ☐ VERY LOW TO LOW POTENTIAL SUBSIDENCE
- ▨ ALLUVIUM AREA WITHIN POTENTIAL SUBSIDENCE ZONES

NOTE:

(1). This map merely illustrates the potential for subsidence. Possible impacts of such subsidence to individual resource areas are discussed in the sections of Chapter 3.

(2). Locations of wells, springs, and stock ponds are also shown on Figure 19. Groundwater Hydrology Map.

North Fork Coal DRAFT EIS

FIGURE 14
SUBSIDENCE POTENTIAL MAP

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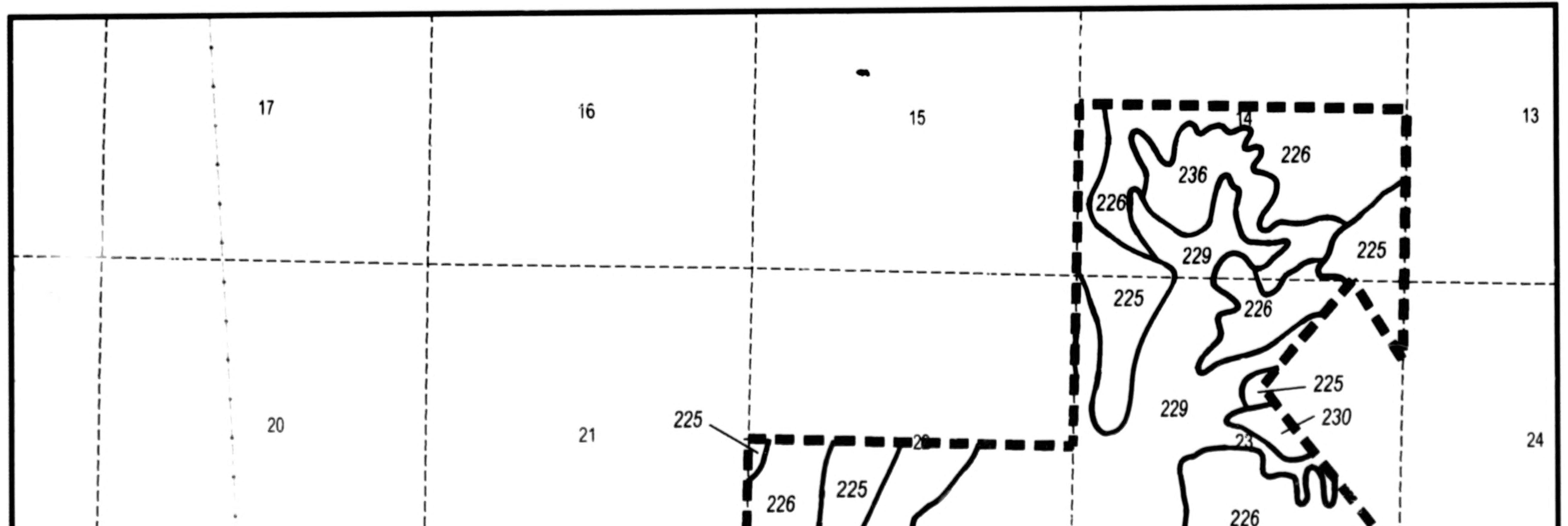

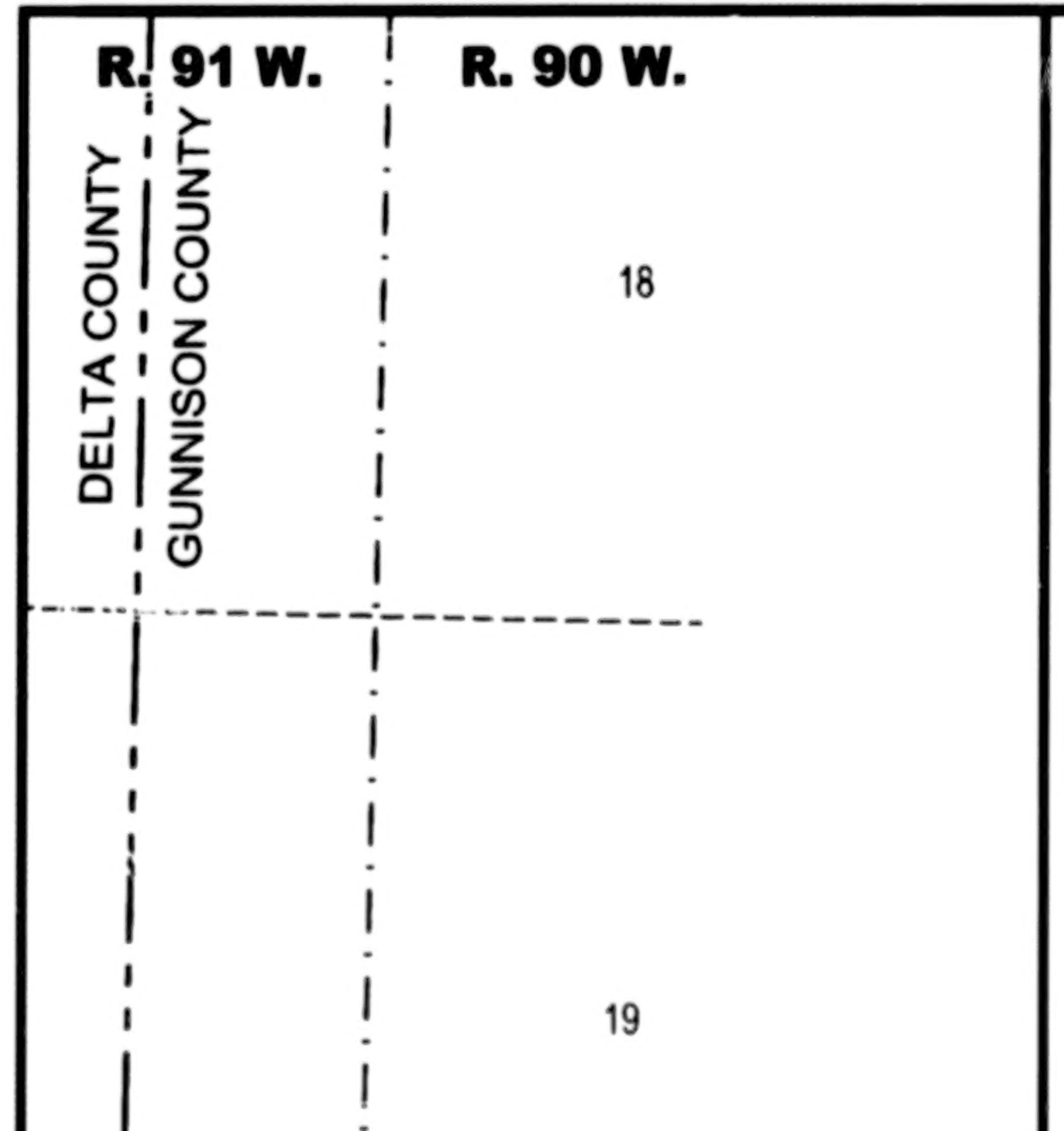

EXPLANATION

▬ PROPOSED COAL LEASE TRACT BOUNDARY
(ELK CREEK & IRON POINT TARCTS)

■ ■ ■ ■ PROPOSED COAL EXPLORATION
LICENSE BOUNDARY

☐ 13 SOIL TYPE LOCATION

NRCS 1981 SOIL UNIT KEY

UNIT NUMBER	UNIT NAME
2	Absarokee - Work loams, 6 to 25 percent slopes
12	Beenom - Absarokee loams, 5 to 20 percent slopes
13	Beenom - Absarokee association, 20 to 60 percent slopes
18	Bulkley clay loam, 12 to 25 percent slopes
33	Delson stony loam, 3 to 20 percent slopes
34	Delson very stony loam, 20 to 60 percent slopes
36	Fluvents, flooded
38	Fughes loam, 15 to 25 percent slopes
39	Fughes loam, 25 to 65 percent slopes
41	Fughes - Curecanti stony loams, 10 to 40 percent slopes
47	Kech - Rock outcrop complex, 10 to 40 percent slopes

U.S. FOREST SERVICE 1997 SOIL UNIT KEY

UNIT NUMBER	UNIT NAME
200	Rock outcrop
207	Boralfs and Borolls, clayey, slumped, 5 to 65 percent slopes
210	Torriorthents, Warm - Rock outcrop complex, 35 to 90 percent slopes
213	Hayrack - Muggins - Nutras complex, 40 to 65 percent slopes
222	Wetopa - Wesdy complex, 5 to 65 percent slopes
225	Herm - Fughes complex, 5 to 25 percent slopes
226	Herm - Fughes - Kolob family complex, 25 to 40 percent slopes
229	Cryocrepts - Cryoborolls - Rubble land complex, 15 to 90 percent slopes
230	Haploborolls - Ustocrepts - Rock outcrop complex, 40 to 99 percent slopes
236	Shawa - Sandia family - Kolob family complex, 5 - 40 percent slopes
237	Shawa - Sandia family - Kolob family complex, 40 to 65 percent slopes
240	Coberly - Falcon, dry complex, 0 -15 percent slopes
290	Godding - Kolob family - Delson complex, 5 to 25 percent slopes, very stony
291	Godding - Kolob family - Delson complex, 25 to 65 percent slopes, extremely stony
293	Leroux - Seitz complex, 5 to 40 percent slopes
302	Cumulic Haploborols, 1 to 3 percent slopes

NUMBER	NAME
2	Absarokee - Work loams, 6 to 25 percent slopes
12	Beenom - Absarokee loams, 5 to 20 percent slopes
13	Beenom - Absarokee association, 20 to 60 percent slopes
18	Bulkley clay loam, 12 to 25 percent slopes
33	Delson stony loam, 3 to 20 percent slopes
34	Delson very stony loam, 20 to 60 percent slopes
36	Fluvents, flooded
38	Fughes loam, 15 to 25 percent slopes
39	Fughes loam, 25 to 65 percent slopes
41	Fughes - Curecanti stony loams, 10 to 40 percent slopes
47	Kech - Rock outcrop complex, 10 to 40 percent slopes
67	Rock outcrop
75	Torriorthents - Rock outcrop, sandstone complex
82	Work loam, 6 to 12 percent slopes
225	Herm - Fughes complex, 5 to 25 percent slopes
226	Herm - Fughes - Kolob family complex, 25 to 40 percent slopes
229	Cryocrepts - Cryoborolls - Rubble land complex, 15 to 90 percent slopes
230	Haploborolls - Ustocrepts - Rock outcrop complex, 40 to 99 percent slopes
236	Shawa - Sandia family - Kolob family complex, 5 - 40 percent slopes
237	Shawa - Sandia family - Kolob family complex, 40 to 65 percent slopes
240	Coberly - Falcon, dry complex, 0 -15 percent slopes
290	Godding - Kolob family - Delson complex, 5 to 25 percent slopes, very stony
291	Godding - Kolob family - Delson complex, 25 to 65 percent slopes, extremely stony
293	Leroux - Seitz complex, 5 to 40 percent slopes
302	Cumulic Haploborols, 1 to 3 percent slopes
325	Broad Canyon - Scout family complex, 25 to 65 percent slopes
360	Nutras - Tellura complex, 5 to 40 percent slopes

North Fork Coal DRAFT EIS

FIGURE 15

SOILS MAP

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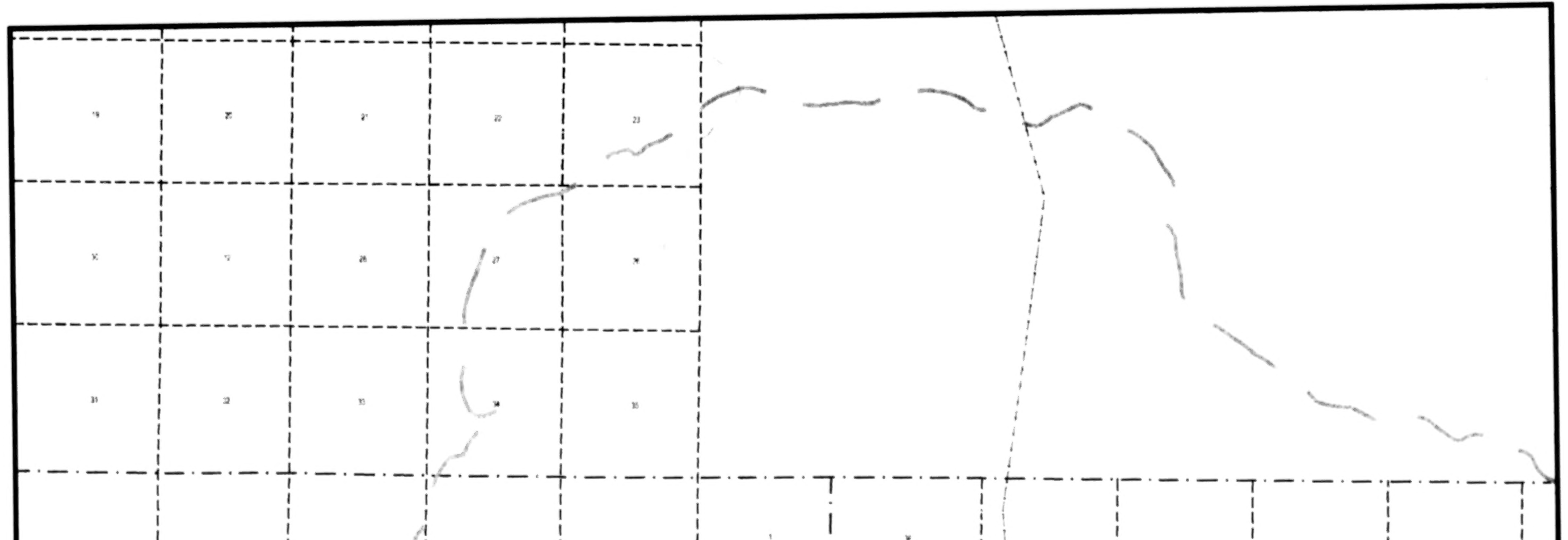

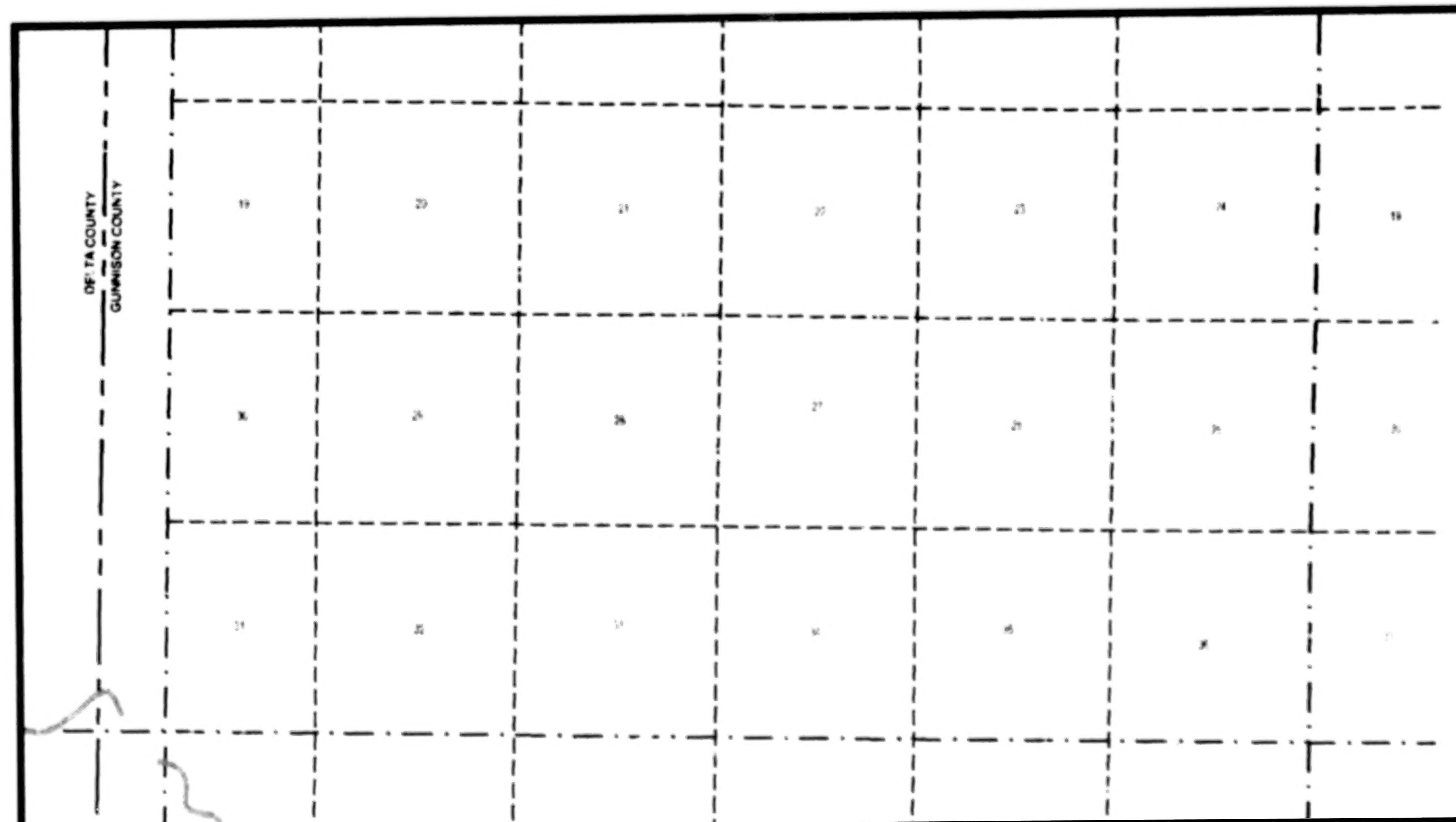

EXPLANATION

━━━	PROPOSED COAL LEASE TRACT BOUNDARY (ELK CREEK & IRON POINT TRACTS)
▬ ▬ ▬	PROPOSED COAL EXPLORATION LICENSE BOUNDARY
— —	WATERSHED BOUNDARY
■ DG	SURFACE WATER MONITORING LOCATION

DG
SURFACE WATER MONITORING LOCATION
HUBBARD CREEK DRAINAGE
IRON POINT COAL EXPLORATION LICENSE AREA
TERROR CREEK DRAINAGE
BEAR CREEK DRAINAGE
ELK CREEK COAL LEASE TRACT
ELK CREEK DRAINAGE
T. 12 S.
T. 13 S.
D32-5
D32-4
D34-12
D34-14
D33-13
D34-15
D34-13
D33-14
H-2
D2
HC (Up)
FG (Low)
TC-West
TC-Up
SD
FG (Up)
BOWIE No 2 MINE
B-2

North Fork Coal DRAFT EIS

FIGURE 16

REGIONAL HYDROLOGY MAP

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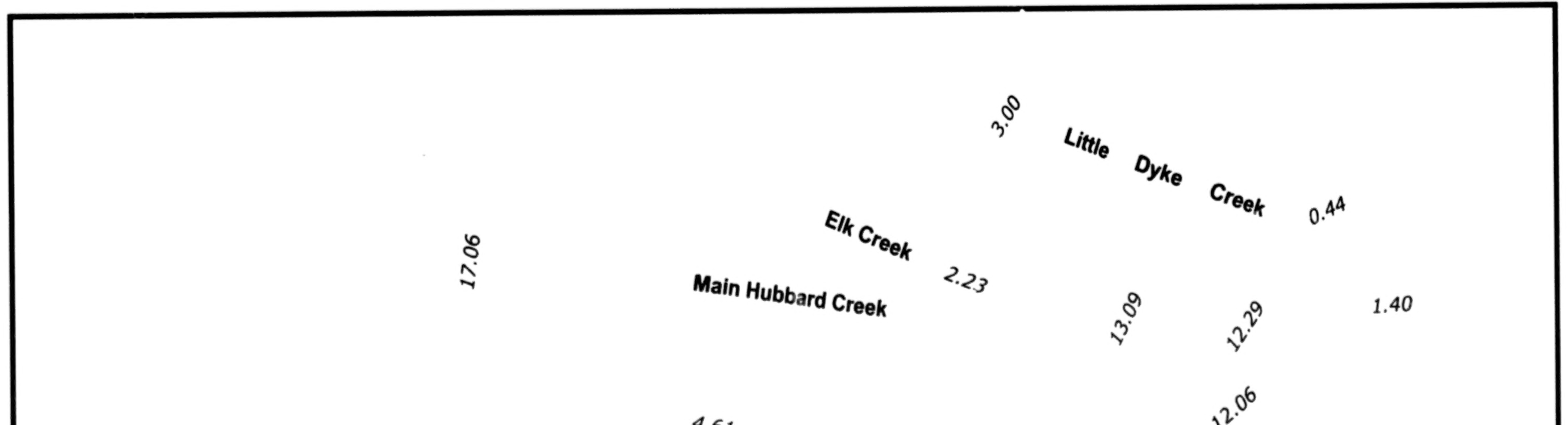
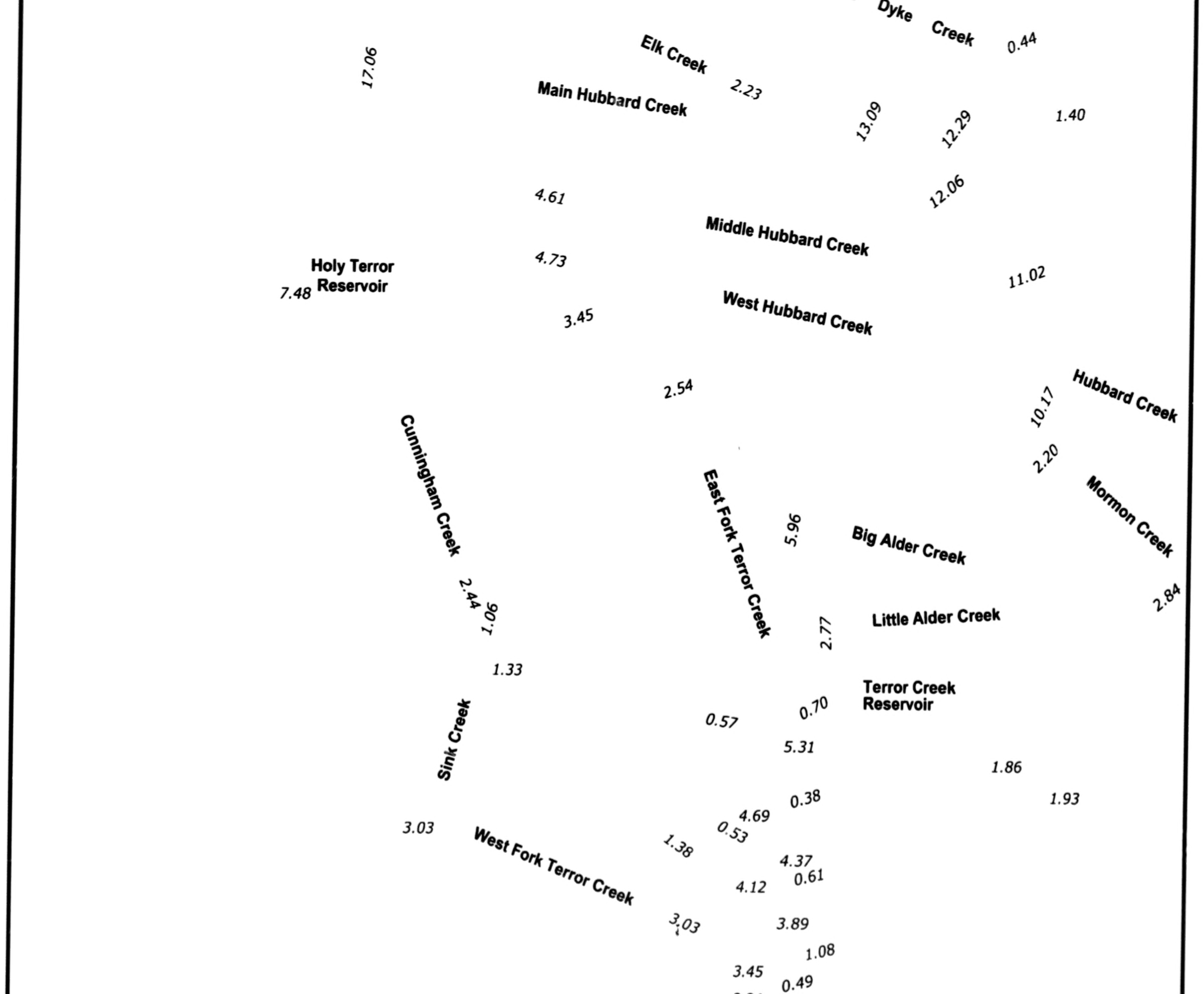
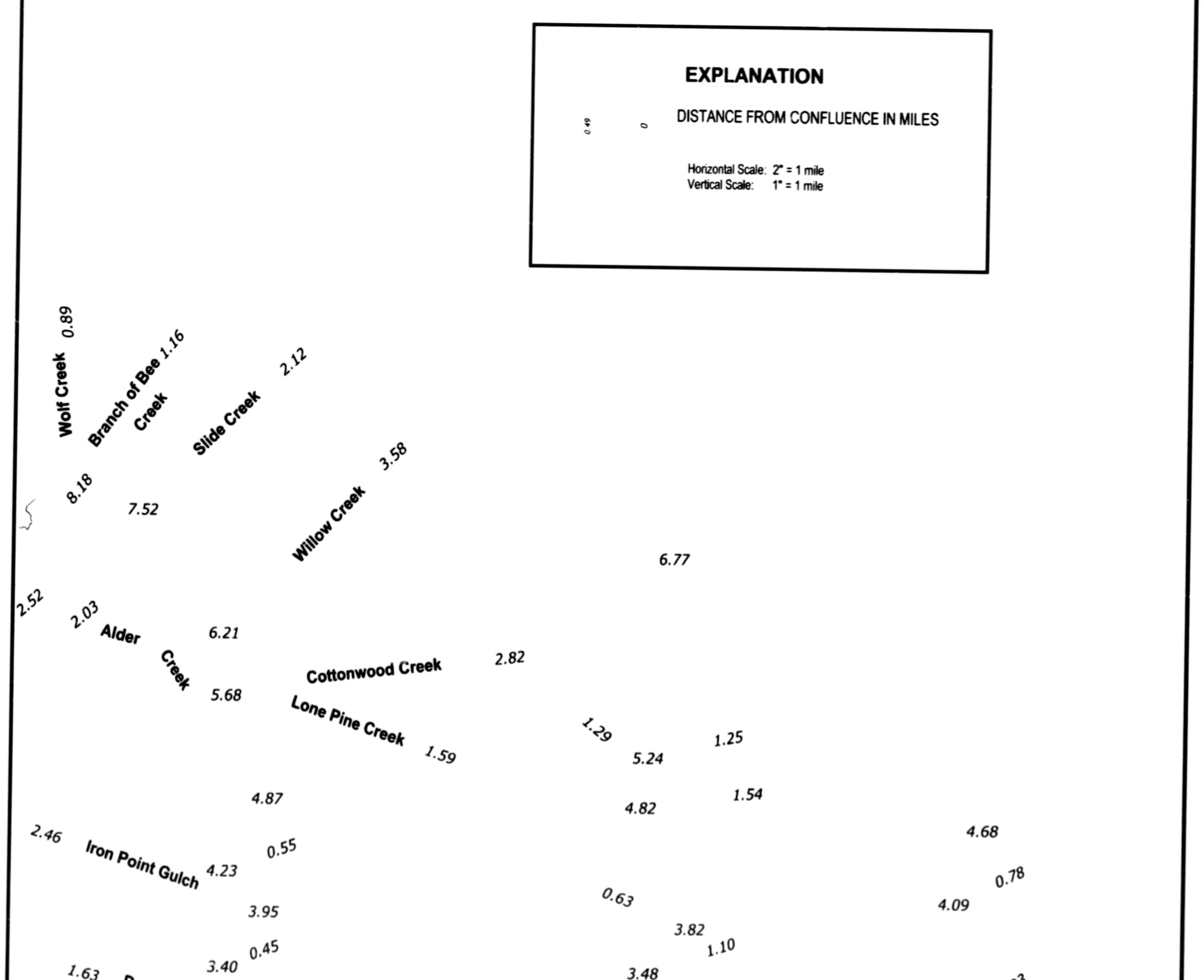


EXPLANATION

DISTANCE FROM CONFLUENCE IN MILES

Horizontal Scale: 2" = 1 mile
Vertical Scale: 1" = 1 mile


Dyke Creek
0.44
17.06
Elk Creek
2.23
Main Hubbard Creek
13.09
12.29
1.40
12.06
4.61
Middle Hubbard Creek
4.73
Holy Terror Reservoir
7.48
3.45
West Hubbard Creek
11.02
2.54
Hubbard Creek
10.17
2.20
Cunningham Creek
Mormon Creek
East Fork Terror Creek
5.96
Big Alder Creek
2.44
1.06
2.84
2.77
Little Alder Creek
1.33
Terror Creek Reservoir
0.70
0.57
Sink Creek
5.31
1.86
1.93
0.38
4.69
0.53
3.03
West Fork Terror Creek
1.38
4.37
0.61
4.12
3.03
3.89
1.08
3.45
0.49


EXPLANATION
0.49
0
DISTANCE FROM CONFLUENCE IN MILES
Horizontal Scale: 2" = 1 mile
Vertical Scale: 1" = 1 mile
0.89
Wolf Creek
Branch of Bee Creek
1.16
Slide Creek
2.12
8.18
7.52
Willow Creek
3.58
6.77
2.52
2.03
Alder Creek
6.21
Cottonwood Creek
2.82
5.68
Lone Pine Creek
1.59
1.29
5.24
1.25
4.87
4.82
1.54
4.68
2.46
Iron Point Gulch
4.23
0.55
0.78
4.09
3.95
0.63
3.82
1.10
1.63
3.40
0.45
3.48

North Fork Coal DRAFT EIS

FIGURE 17

REGIONAL STREAM NETWORK

BEST COPY AVAILABLE

EXPLANATION

━━ PROPOSED COAL LEASE TRACT BOUNDARY (ELK CREEK & IRON POINT TRACTS)

▬ ▬ ▬ PROPOSED COAL EXPLORATION LICENSE BOUNDARY

— — WATERSHED BOUNDARY

◈ 40 WATER RIGHT LOCATION

WATER RIGHTS KEY

WATER RIGHT	LOCATION	MAP

PROPOSED COAL LEASE TRACT BOUNDARY (ELK CREEK & IRON POINT TRACTS)

PROPOSED COAL EXPLORATION LICENSE BOUNDARY

WATERSHED BOUNDARY

◆ 40 WATER RIGHT LOCATION

WATER RIGHTS KEY

WATER RIGHT NAME	LOCATION						MAP NUMBER
	TS	RNG	SEC	Q160	Q40	Q10	
Carter Ditch	12S	91W	24	NE	NW	SE	1
Bruce Park Reservoir	12S	91W	28	SW	SE	SE	2
Bruce Park Reservoir	12S	91W	28	SW	SE	SE	2
Blue Ribbon Ditch No.1	13S	91W	2	NW	NW	NE	3
Blue Ribbon Reservoir No.1	13S	91W	2	NW	NW	SE	4
Blue Ribbon Well	13S	91W	2	NW	NW	NE	5
J & M Spring & PL No.2	13S	91W	3	NW	SW	SW	6
J & M Spring & PL No.1	13S	91W	4	NE	NE	SW	7
Deer Trail Ditch	13S	91W	11	NE	SW	NW	8
Deer Trail Ditch	13S	91W	11	NE	SW	NW	8
Deer Trail Ditch	13S	91W	11	NE	SW	NW	8
Deer Trail Ditch	13S	91W	11	NE	SW	NW	8
Deer Trail Ditch	13S	91W	11	NE	SW	NW	8
Deer Trail Ditch	13S	91W	11	NE	SW	NW	8
Majnik Ditch	13S	91W	14	NE	NW	NE	9
Mayes Ditch	13S	91W	14	NE	NE	NE	10
TERROR CREEK							
Grand Mesa Canal HGT 3	12S	91W	29	SE	NE	SW	11
Garvin Mesa Pipline CO.	12S	91W	32	SW	NE	NW	12
Hughes Pipline	12S	91W	32	SW	SW	SE	13
J & M Spring & PL No.3	13S	91W	4	NW	SW	SE	14
J & M Spring & PL No.4	13S	91W	4	NE	SW	NW	15
J & M Spring & PL No.5	13S	91W	4	NW	SE	NW	16
Barrow Spring Pipline	13S	91W	5	NW	SW	SW	17
Leonard Spring No.1	13S	91W	7	NE	SE	NE	18
Leonard Spring No.2	13S	91W	7	NE	SE	NE	19
Terror Ditch	13S	91W	17	NE	NE	SE	20
Terror Ditch	13S	91W	17	NE	NE	SE	20
Terror Ditch	13S	91W	17	NE	NE	SE	20
Terror Ditch	13S	91W	17	NE	NE	SE	20
Fawcett Ditch	13S	91W	21	SW	NE	SW	21
Fawcett Ditch	13S	91W	21	SW	NE	NW	21
Holybee Ditch	13S	91W	21	NW	SW	SE	22
Fire Mountain Canal	13S	91W	21	SW	NW	NE	23
Pupik Pond	13S	91W	21	SW	NW	NE	24
Clouds Well	13S	91W	21	SE	SW	NW	25
NORTH FORK GUNNISION RIVER							
Fire Mountain Canal	13S	90W	8	SW	SW	SW	23
Fire Mountain Canal	13S	90W	8	SW	SW	SW	23

Terror Ditch	13S	91W	17	NE	NE	SE	2
Terror Ditch	13S	91W	17	NE	NE	SE	20
Terror Ditch	13S	91W	17	NE	NE	SE	20
Fawcett Ditch	13S	91W	21	SW	NE	SW	21
Fawcett Ditch	13S	91W	21	SW	NE	NW	21
Holybee Ditch	13S	91W	21	NW	SW	SE	22
Fire Mountain Canal	13S	91W	21	SW	NW	NE	23
Pupik Pond	13S	91W	21	SW	NW	NE	24
Clouds Well	13S	91W	21	SE	SW	NW	25
NORTH FORK GUNNISION RIVER							
Fire Mountain Canal	13S	90W	8	SW	SW	SW	23
Fire Mountain Canal	13S	90W	8	SW	SW	SW	23
Fire Mountain Canal	13S	90W	8	SW	SW	SW	23
Somerset Mine Well	13S	91W	8	SE	SW		24
Bear Well No.1	13S	91W	8	SE	SE		25
Fire Mountain Canal	13S	90W	17	NW	NW	SW	23
Fire Mountain Canal	13S	90W	17	NW	NW	SW	23
Fire Mountain Canal	13S	90W	17	NW	NW	SW	23
Carrol Ditch	13S	91W	18	NW			26
New Majnik House Well	13S	91W	14	NE	SE	SE	27
Sell No.1 Well	13S	91W	14	NE	SE	SE	28
Jenkins Ditch No.1	13S	91W	15	SW	SW	SE	29
Jenkins Ditch No.1	13S	91W	15	SW	SW	SE	29
Jenkins Ditch No.2	13S	91W	15	SW	SE	NW	30
Jenkins Ditch No.2	13S	91W	15	SW	SE	NW	30
Stewart Ditch	13S	91W	15	SW	SE	SE	31
Bronish No.1 Well	13S	91W	15	SE	NW	SE	32
Stephens Ditch	13S	91W	21	SE	SE	SE	33
Stephens Ditch	13S	91W	21	NW			33
Stephens Ditch	13S	91W	21	NW			33
Stephens Ditch	13S	91W	21	NW			33
Stephens Ditch	13S	91W	21	NW			33
Stephens Ditch	13S	91W	21	NW			33
Toltec Spring	13S	91W	21	SE	NW	NW	34
Train Loadout Well No.1	13S	91W	29	SE	NW	NE	35
BEAR CREEK							
Burtard Ditch	12S	90W	30	NW	SW	NW	36
HUBBARD CREEK							
Wade Allen Ditch	12S	91W	10	SE	NW	NE	37
Wade Allen Ditch	12S	91W	10	SE	NW	NE	37
Carl Gaplin Ditch	12S	91W	12	SW	SE	NW	38
Pilot Knob Ditch	12S	91W	12	SW	SW	SE	39
Hubbard Creek	12S	91W	14	SE	NW	NW	40
NON ADJUDICATED WELLS							
Peggy Seabloom Well	12S	91W	29	SW	NW		41
Clay King Well	13S	91W	6	NW	NW		42

North Fork Coal DRAFT EIS

FIGURE 18
WATER RIGHTS

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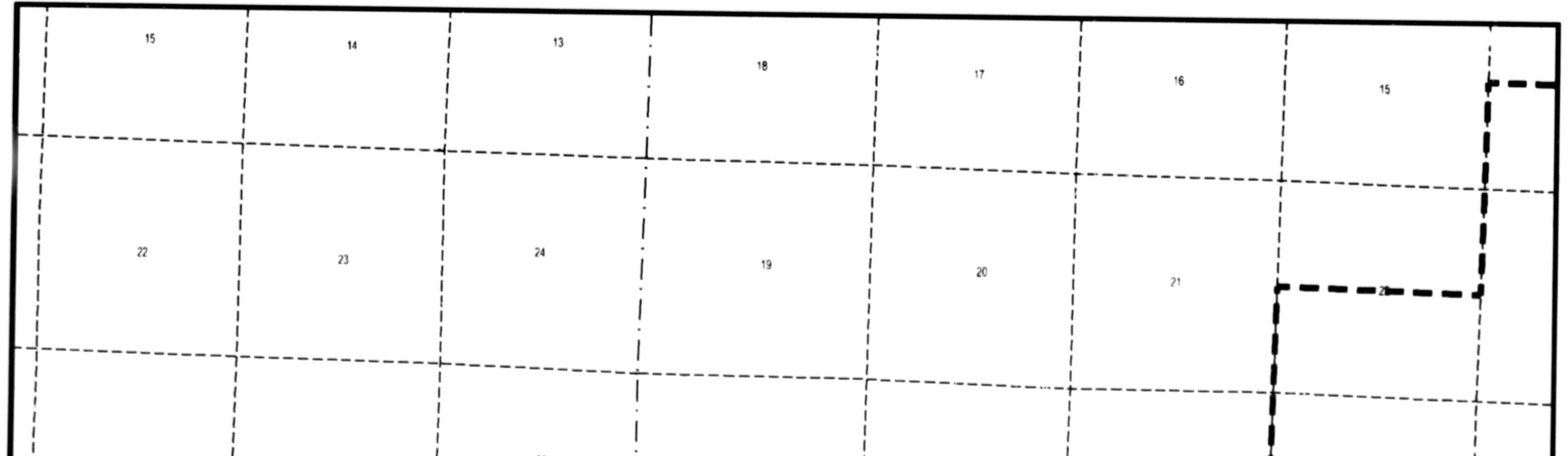

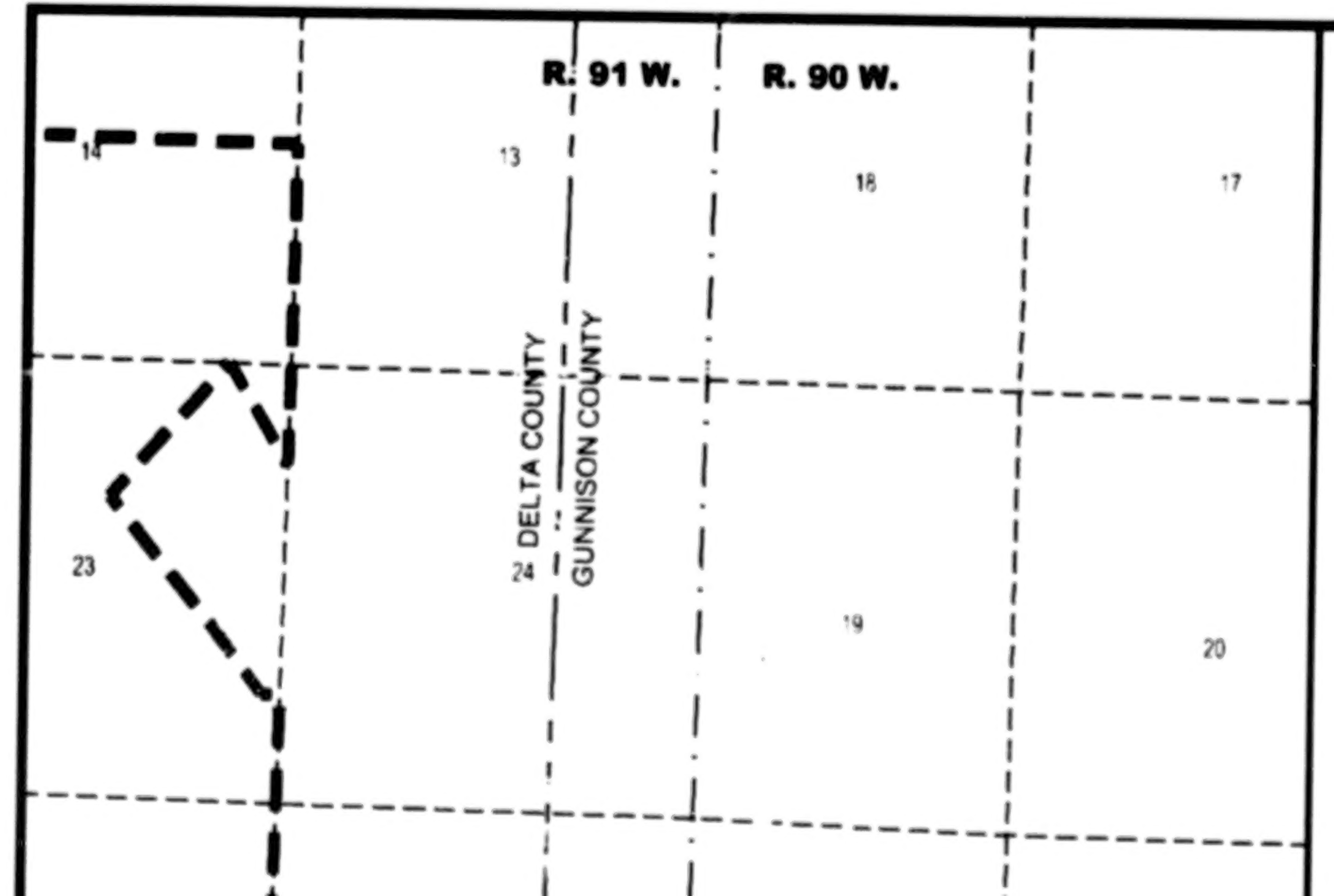

EXPLANATION

PROPOSED COAL LEASE TRACT BOUNDARY
(ELK CREEK & IRON POINT TRACTS)

PROPOSED COAL EXPLORATION
LICENSE BOUNDARY

● DH-13 GROUNDWATER WELL

▲ *SB-5* SPRING

SPRING WITH POND

▼ *ECSP-15* STOCK POND

NOTE:
(1). Cross-Section A-A' is shown on Figure 20, Conceptual Hydrogeologic Cross-Section A-A'.

NOTE:
(1). Cross-Section A-A' is shown on Figure 20, Conceptual Hydrogeologic Cross-Section A-A'.

North Fork Coal DRAFT EIS

FIGURE 19

GROUNDWATER HYDROLOGY

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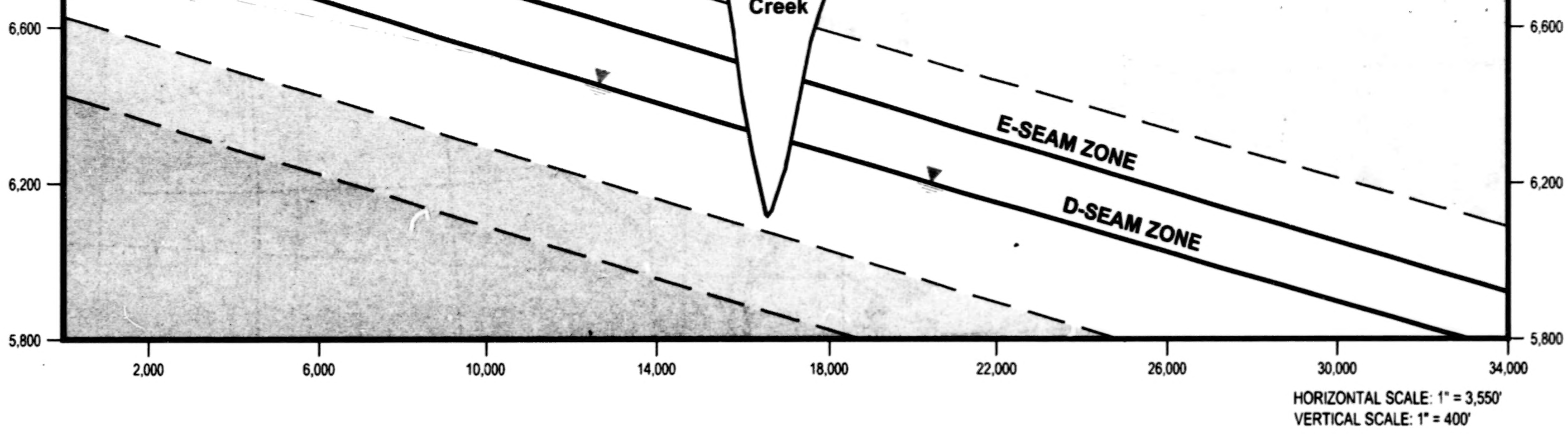
22

All Rights

NOTE:
(1). The Location of Cross-Section A-A' is shown on Figure 19, Groundwater Hydrology.

(2). The potentiometric surface for the D - seam is inferred.



(2). The potentiometric surface for the D - seam is inferred.

North Fork Coal DRAFT EIS

FIGURE 20

CONCEPTUAL HYDROGEOLOGIC CROSS-SECTION A-A'

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EXPLANATION

━━ PROPOSED COAL LEASE TRACT BOUNDARY (ELK CREEK & IRON POINT TRACTS)

■ ■ ■ ■ PROPOSED COAL EXPLORATION LICENSE BOUNDARY

☐ BARE

▨ GRASS / FORB

▨ OAK

☐ COTTONWOOD

PROPOSED COAL LEASE TRACT BOUNDARY
(ELK CREEK & IRON POINT TRACTS)
PROPOSED COAL EXPLORATION LICENSE BOUNDARY
BARE
GRASS / FORB
OAK
COTTONWOOD
DOUGLAS FIR
PINYON / JUNIPER
ASPEN
SPRUCE / FIR
N
SCALE
2000'
0
2000'
CONTOUR INTERVAL 200FT.
DELTA COUNTY
GUNNISON COUNTY
Iron Point
17
16
15
14
13
18
20
21
22
23
24
19
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T.
12

North Fork Coal DRAFT EIS

FIGURE 21

VEGETATION MAP

BEST COPY AVAILABLE

8
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12
7
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10
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12
DELTA COUNTY
GUNNISON COUNTY
14
13
18
17
16
15
14
13
Pilot Knob

T. 12 S.
T. 13 S.
Cottonwood Spring
Iron Point
Morrell Cow Camp
BOWIE No.2 MINE
DELTA COUNTY
GUNNISON COUNT
Pilot Knob

NOTE:
(1). Source: Colorado Division of Wildlife (Update 1995).

North Fork Coal DRAFT EIS

FIGURE 22
MULE DEER RANGE

BEST COPY AVAILABLE

8
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7
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9
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11
12
DELTA COUNTY
GUNNISON COUNTY
14
13
18
17
Pilot Knob
16
15
14
13

15
14
13
18
17
16
15
22
23
24
19
20
21
27
26
25
30
29
28
27
Iron Point
34
35
36
31
Cottonwood Stump
32
33
34
35
T. 12 S.
T. 13 S.
3
2
Morrell Cow Camp
1
6
5
4
3
2
10
11
12
7
10
DELTA COUNTY
GUNNISON COUNTY
14
13
18
17
Pilot Knob
16
15
14
13
23
24
19
20
21
22
23
24
26
25
30
29
28
27
26
25
36
31
32
33
34
35
36
1
5
3
2
1

NOTE:
(1). Source: Colorado Division of Wildlife (Update 1995).

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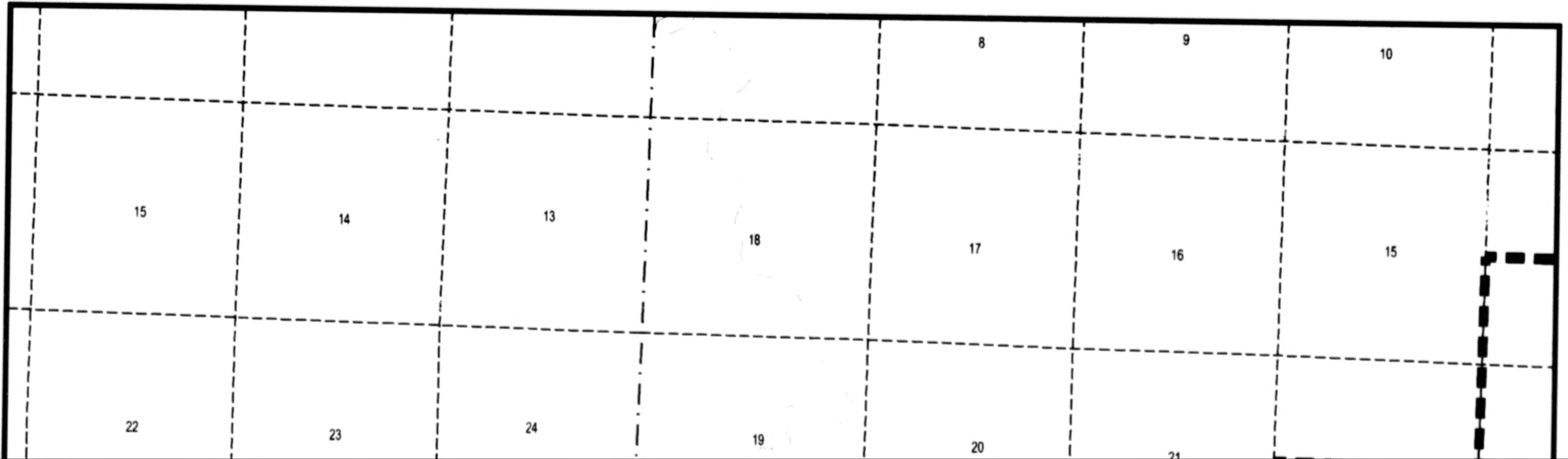
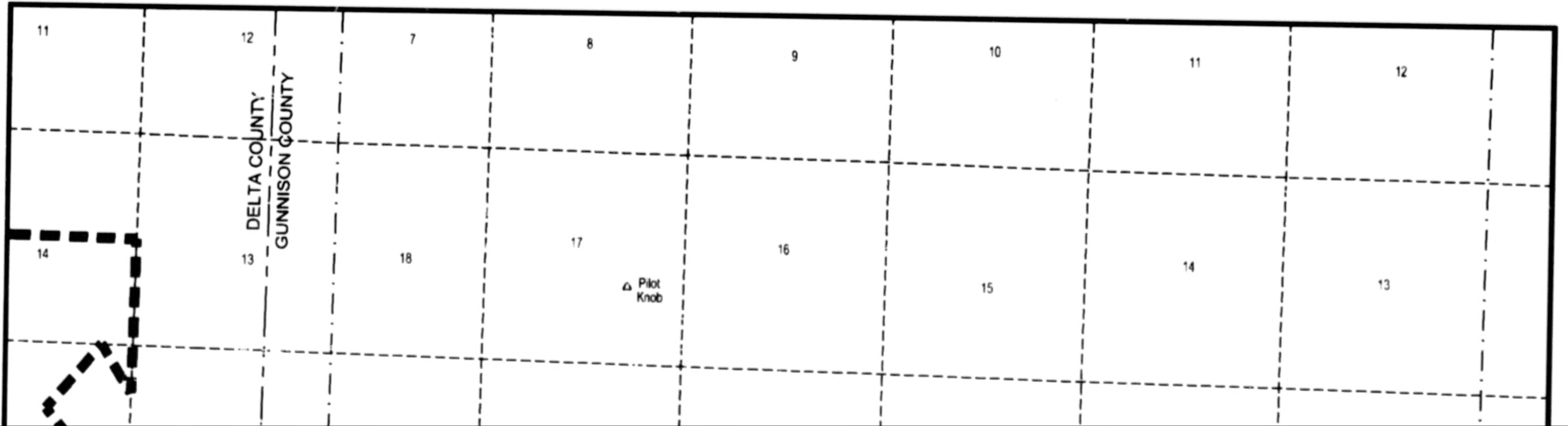
North Fork Coal DRAFT EIS

FIGURE 23
ELK RANGE


8
9
10
15
14
13
18
17
16
15
22
23
24
19
20
21


11
12
7
8
9
10
11
12
DELTA COUNTY
GUNNISON COUNTY
14
13
18
17
Pilot Knob
16
15
14
13

DELTA CO
GUNNISON
Pilot Knob
Iron Point
Cottonwood
Morrell Cow Camp
T. 12 S.
T. 13 S.
BOWIE No.2 MINE PORTAL AREA

BOWIE No.2 MINE
PORTAL AREA
OXBOW SURFACE
FACILITIES
Radio Tower
Somerset
Bowie
Paonia
R. 92 W.
R. 91 W.
R. 90 W.
R. 89 W.
EXPLANATION
PROPOSED COAL LEASE TRACT BOUNDARY
(ELK CREEK & IRON POINT TRACTS)
PROPOSED COAL EXPLORATION
LICENSE BOUNDARY
WINTER CONCENTRATION AREA
WINTER RANGE
NOTE:
(1). Source: Colorado Division of Wildlife (Update 1995)
N
SCALE
4000
0
4000

North Fork Coal DRAFT EIS

FIGURE 24
BALD EAGLE RANGE

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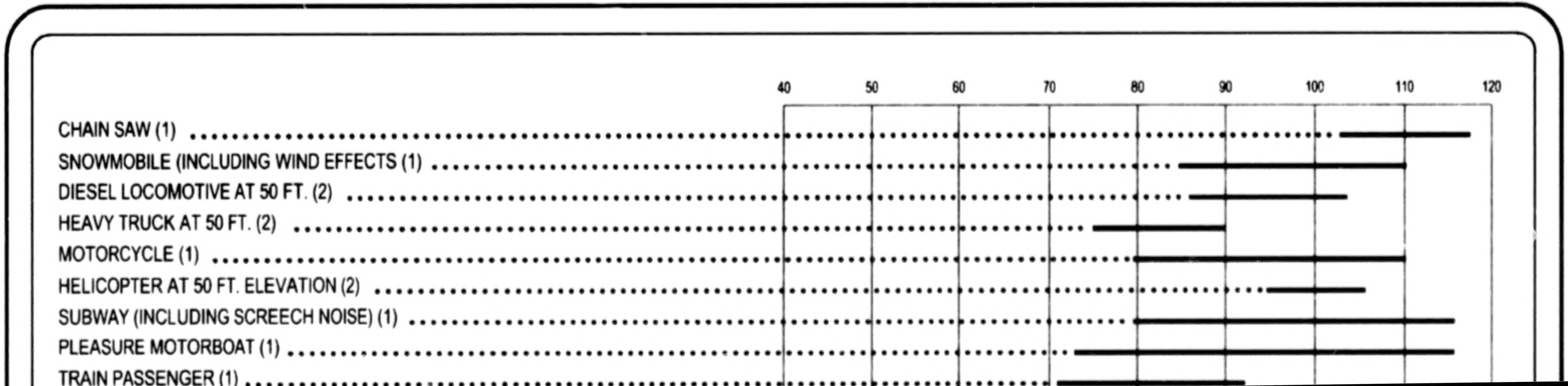
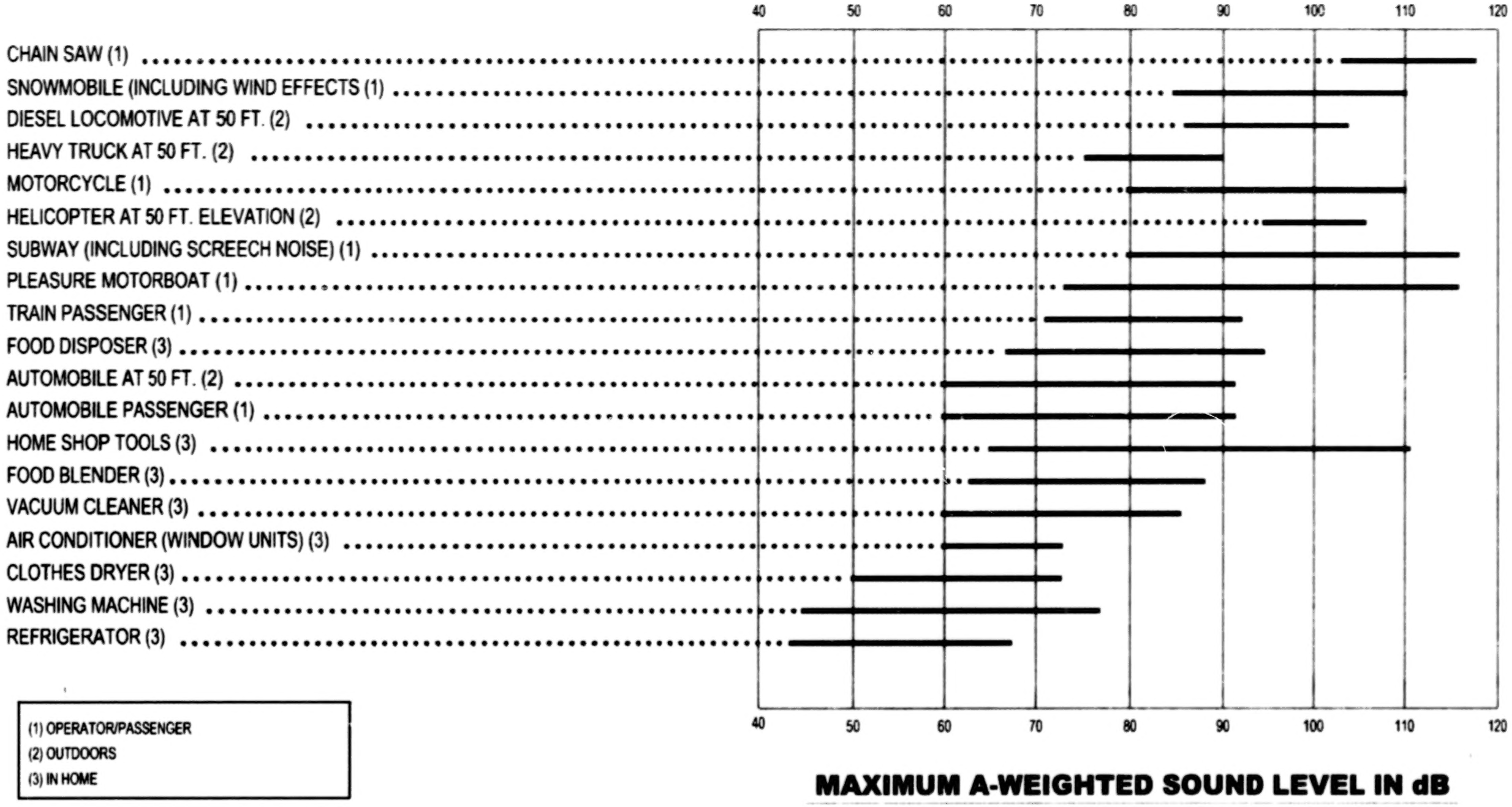
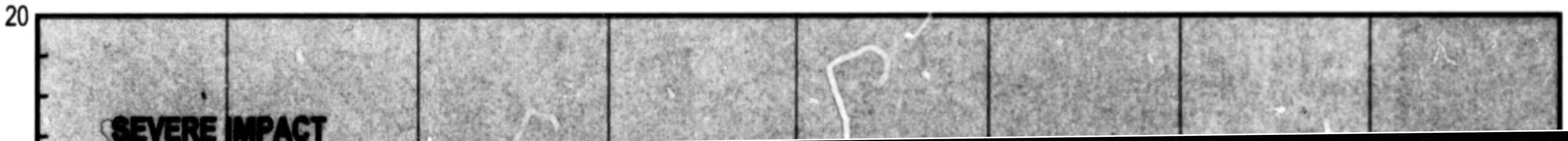
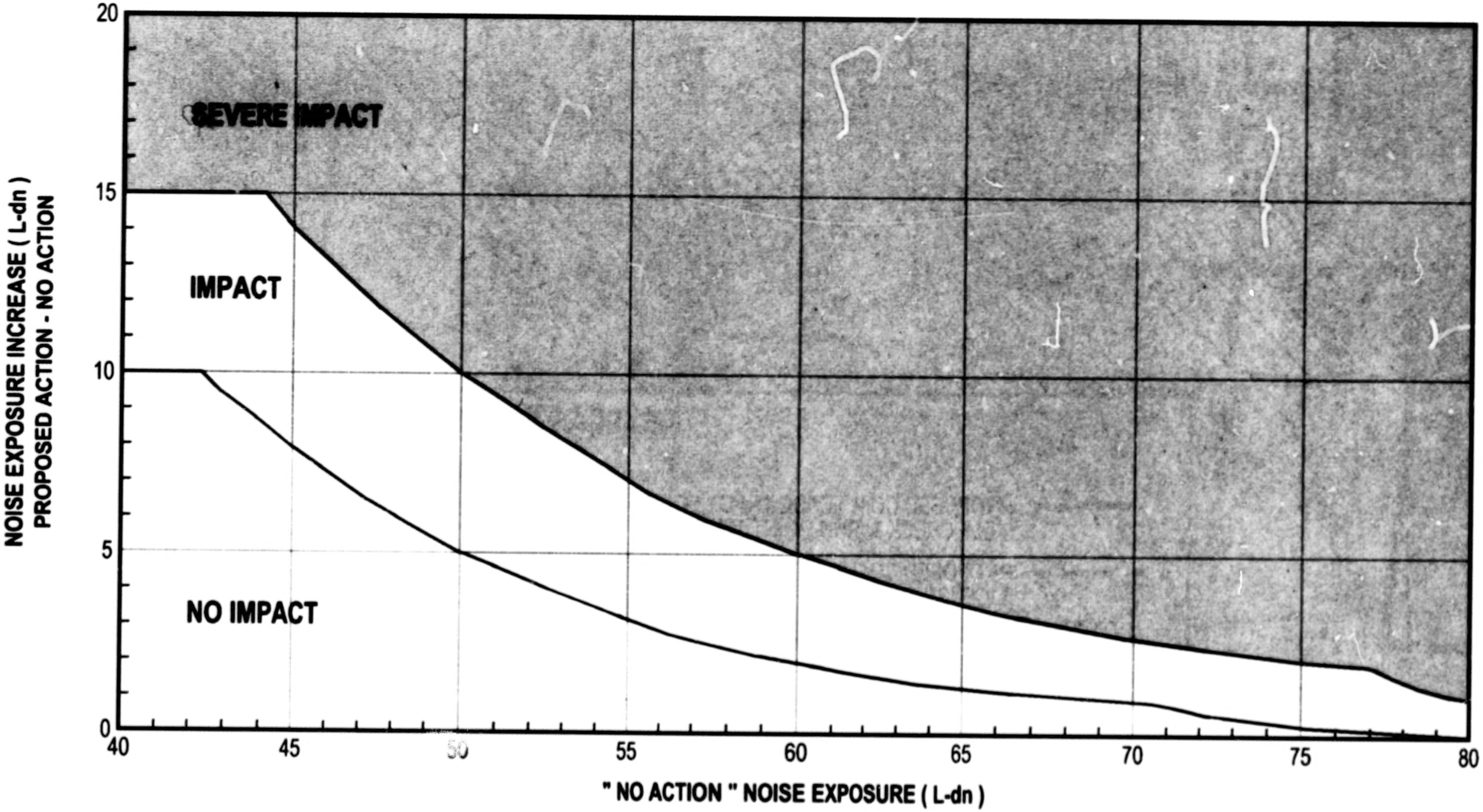


40
50
60
70
80
90
100
110
120
CHAIN SAW (1)
SNOWMOBILE (INCLUDING WIND EFFECTS (1)
DIESEL LOCOMOTIVE AT 50 FT. (2)
HEAVY TRUCK AT 50 FT. (2)
MOTORCYCLE (1)
HELICOPTER AT 50 FT. ELEVATION (2)
SUBWAY (INCLUDING SCREECH NOISE) (1)
PLEASURE MOTORBOAT (1)
TRAIN PASSENGER (1)



North Fork Coal DRAFT EIS
FIGURE 25
NOISE LEVELS CAUSED BY TYPICAL ACTIVITIES



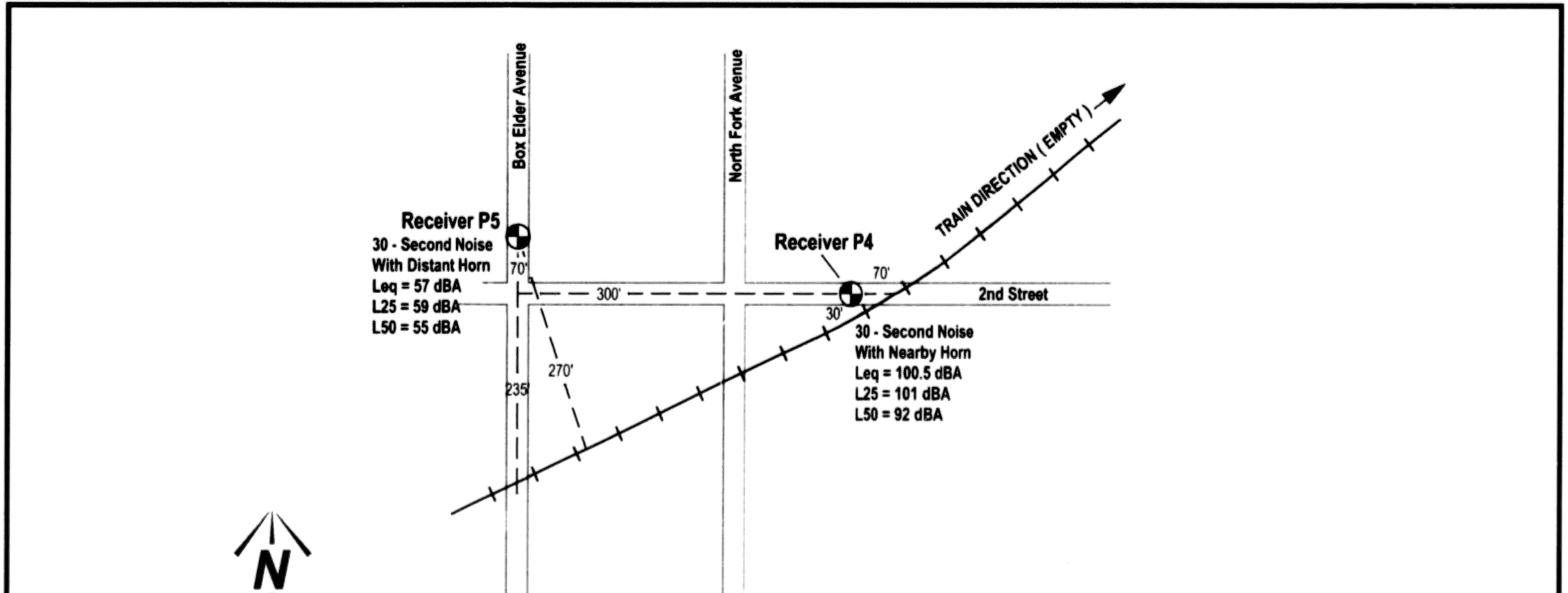


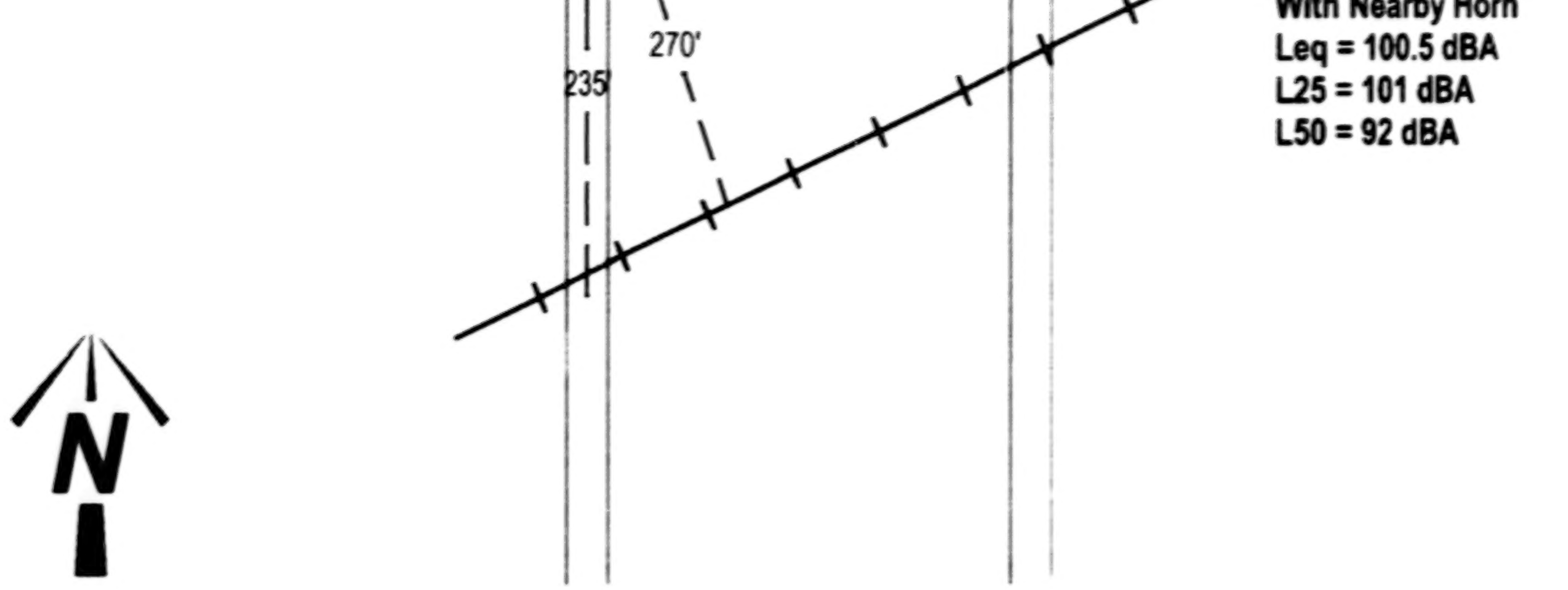
North Fork Coal DRAFT EIS

FIGURE 26

FEDERAL TRANSIT ADMININSTRATION NOISE IMPACT CRITERIA FOR HIGHWAY TRAFFIC AND RAILROAD PROJECTS

BEST COPY AVAILABLE

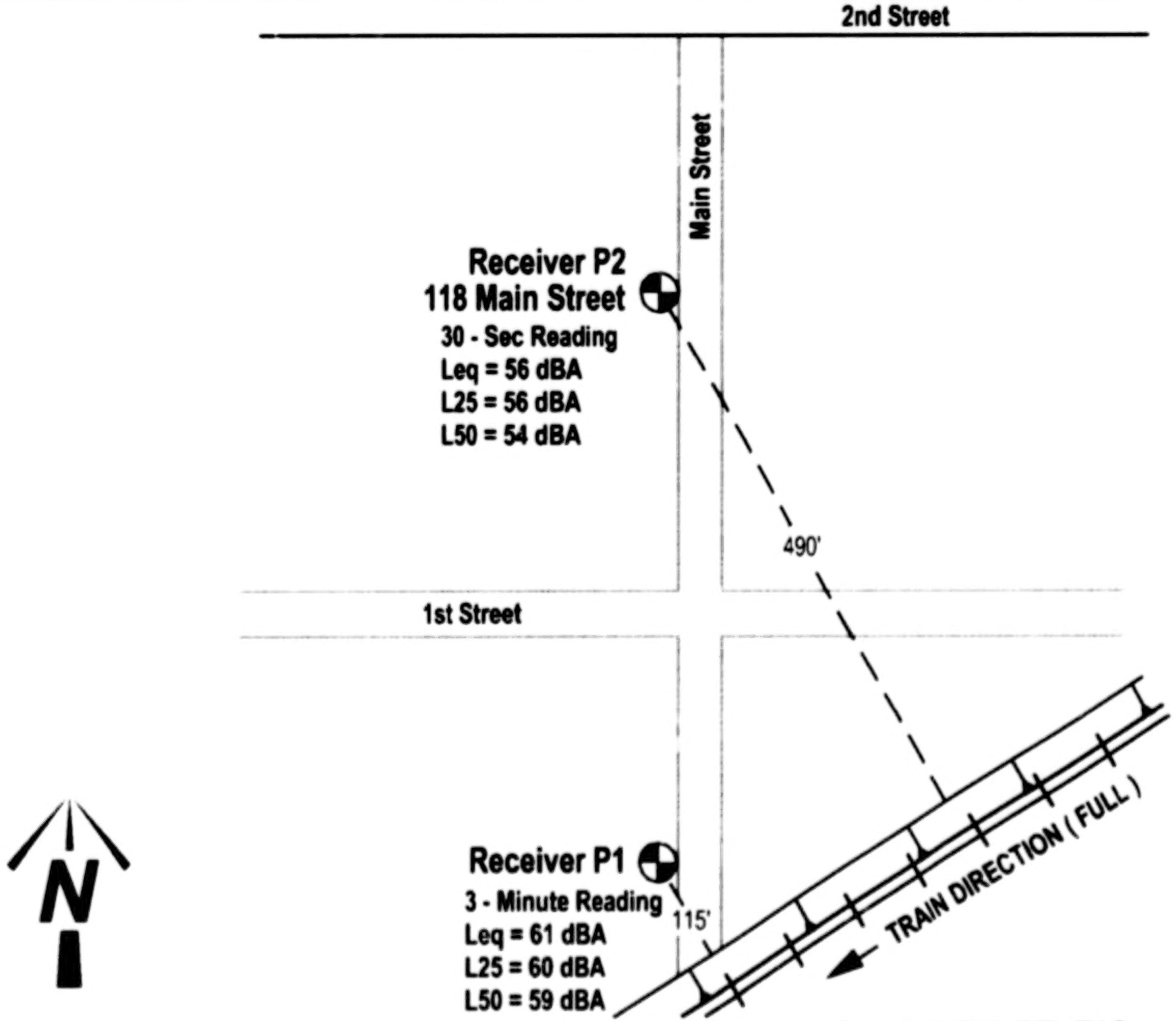

Box Elder Avenue
North Fork Avenue
Receiver P5
30 - Second Noise
With Distant Horn
Leq = 57 dBA
L25 = 59 dBA
L50 = 55 dBA
70'
300'
270'
235'
Receiver P4
70'
30'
2nd Street
30 - Second Noise
With Nearby Horn
Leq = 100.5 dBA
L25 = 101 dBA
L50 = 92 dBA
TRAIN DIRECTION (EMPTY)
N



North Fork Coal DRAFT EIS

FIGURE 27

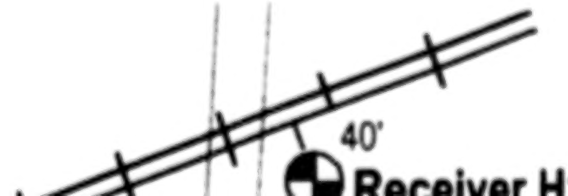
TRAIN NOISE AT PAONIA (4/21/99)

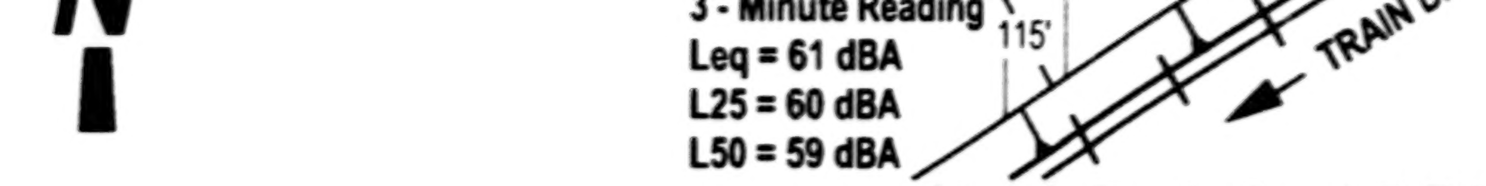


North Fork Coal DRAFT EIS

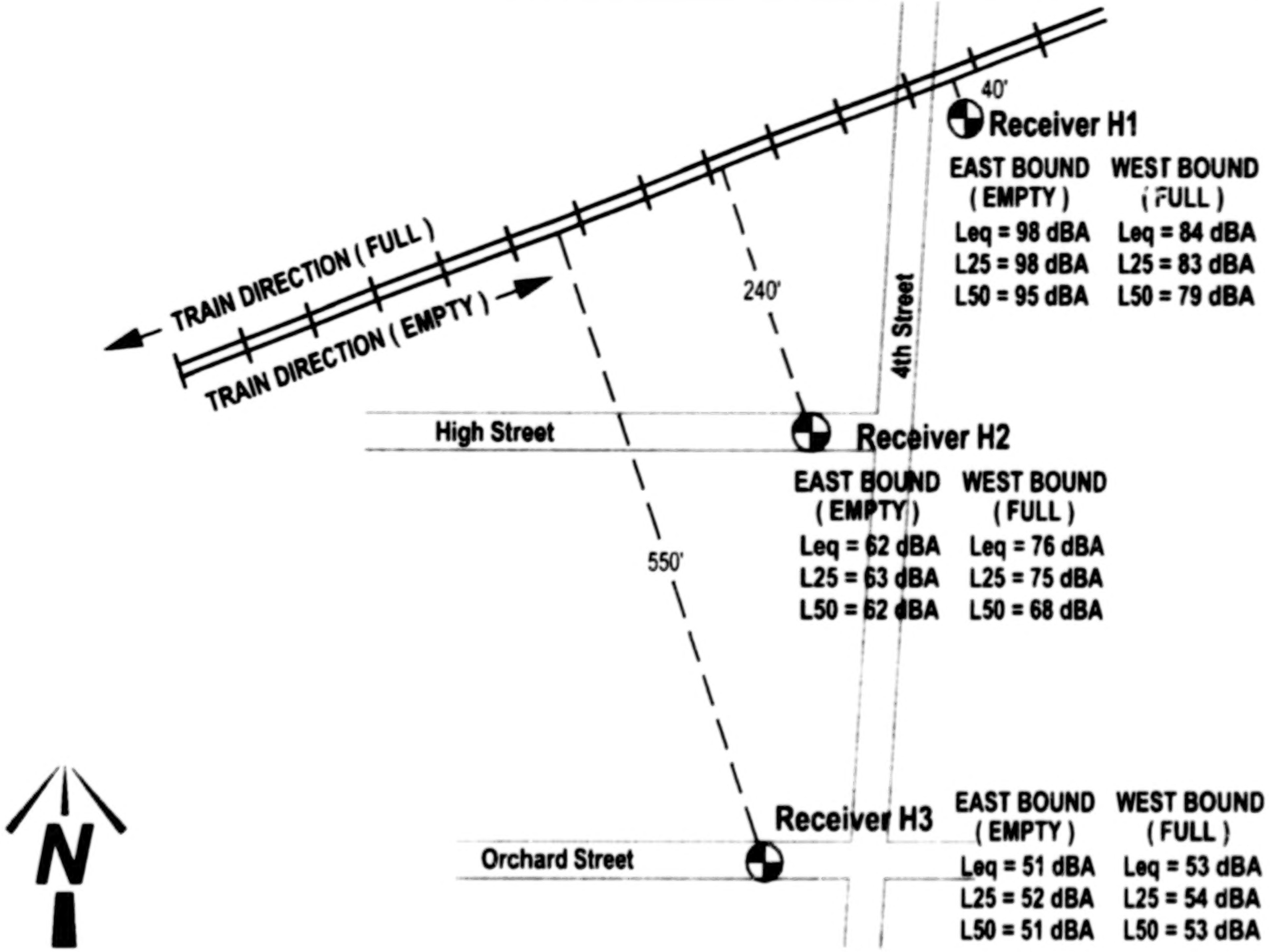
FIGURE 28

TRAIN NOISE AT PAONIA (4/25/99)





North Fork Coal DRAFT EIS
FIGURE 28
TRAIN NOISE AT PAONIA (4/25/99)



North Fork Coal DRAFT EIS
FIGURE 29
TRAIN NOISE AT HOTCHKISS (4/21/99 & 4/25/99)

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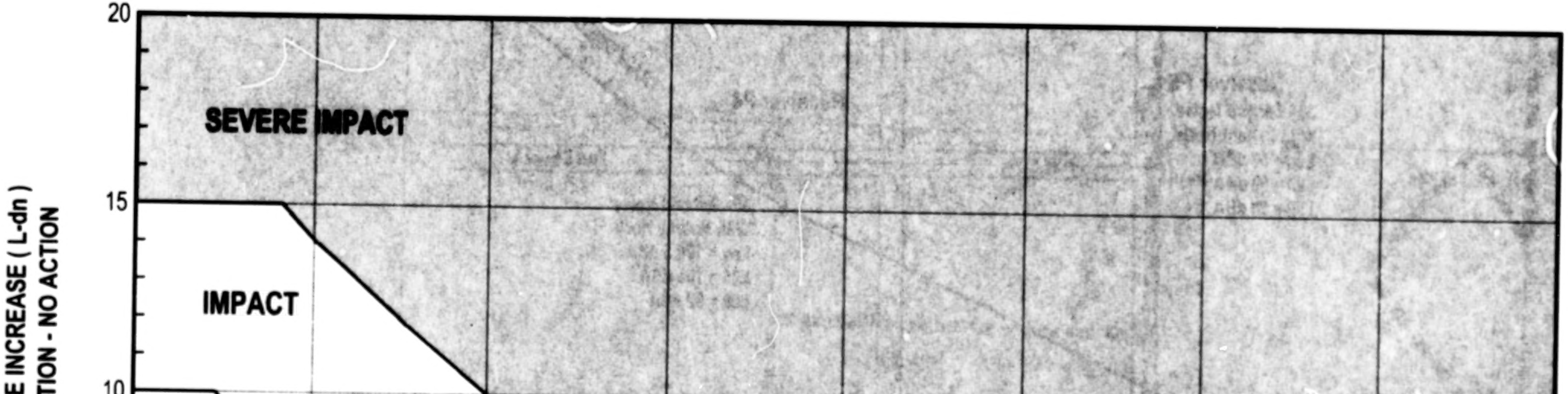
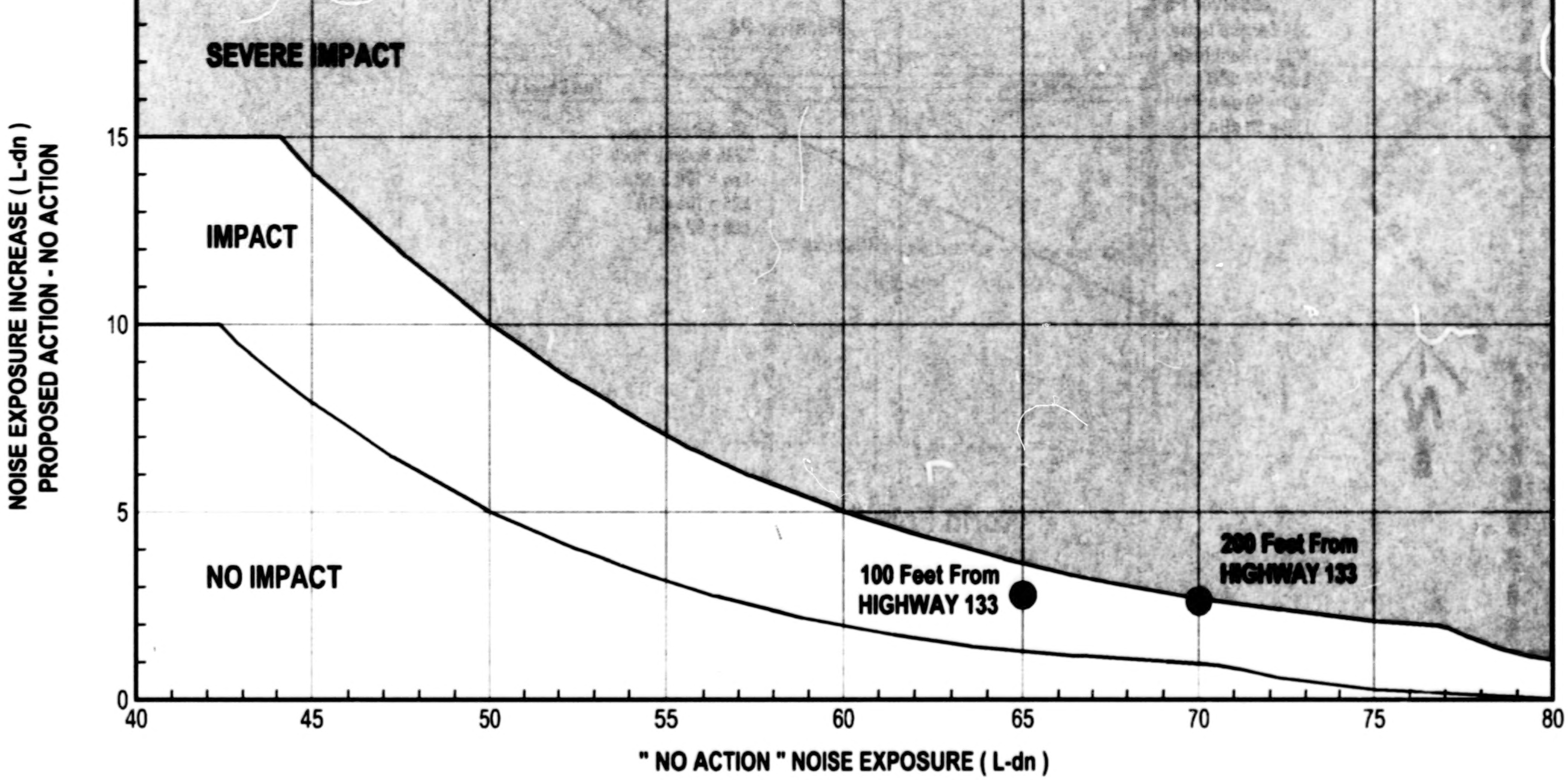
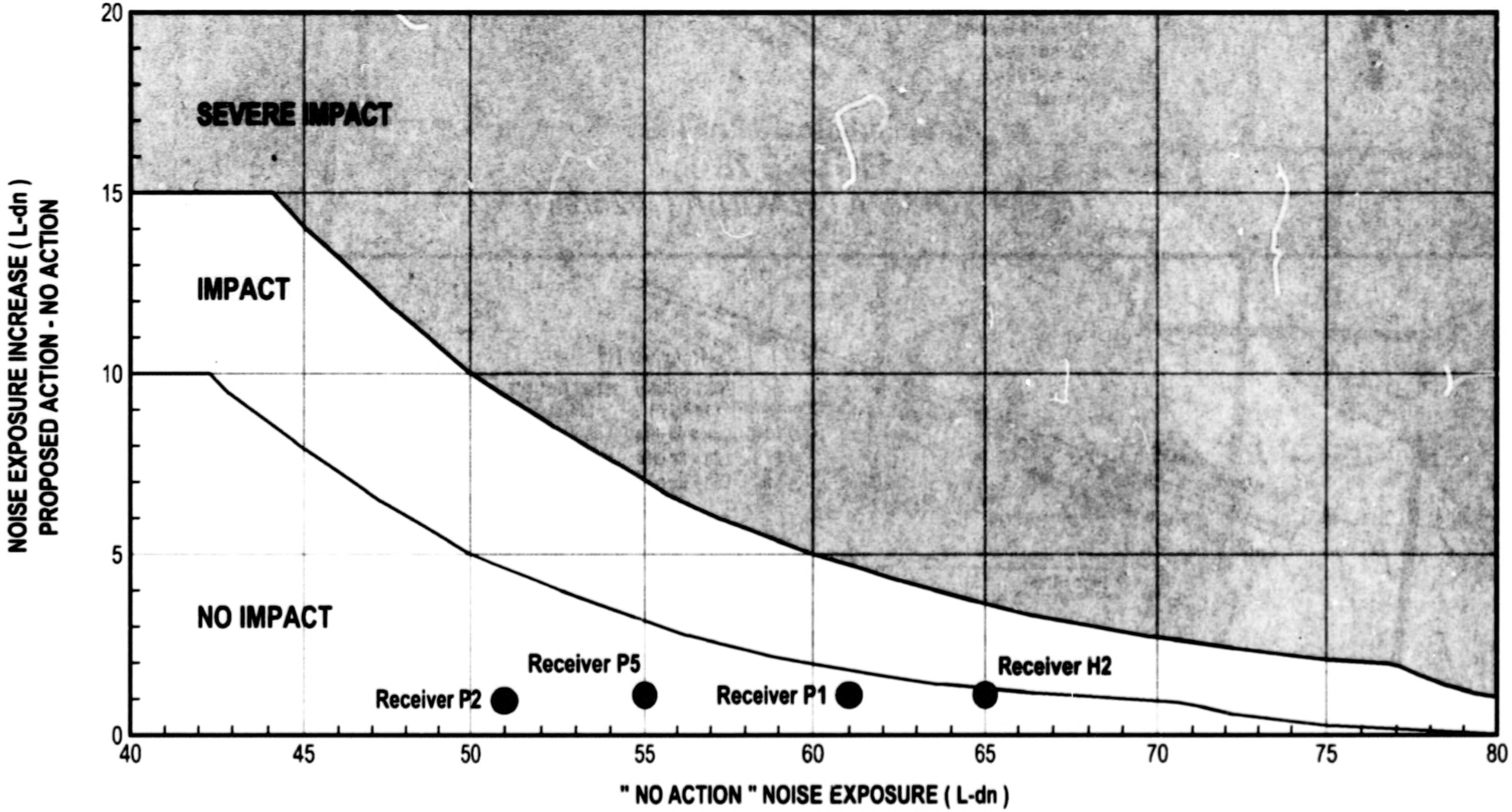

20
15
10
SEVERE IMPACT
IMPACT
E INCREASE (L-dn)
TION - NO ACTION



IMPACTS OF TRAFFIC INCREASES ON HIGHWAY 133

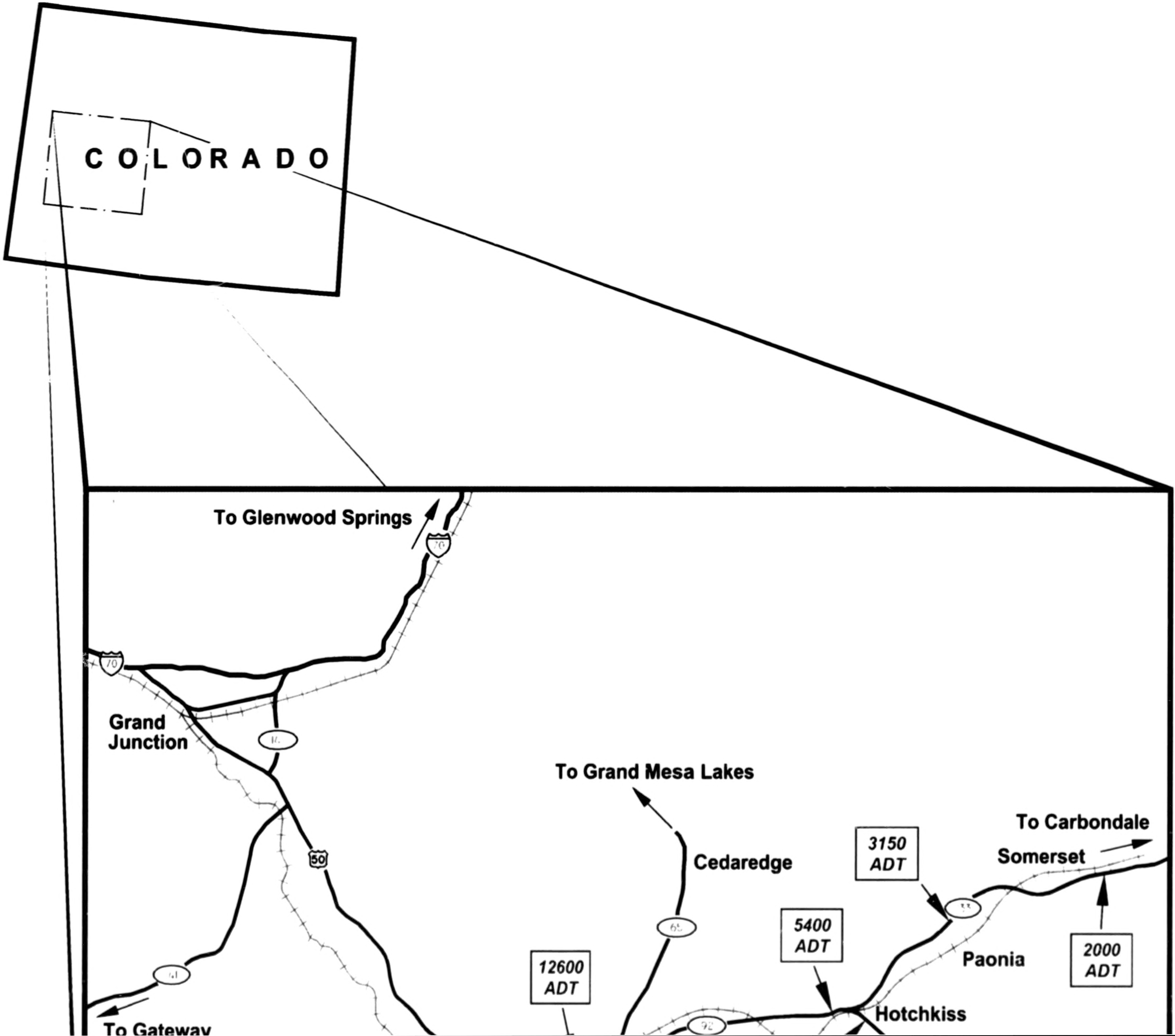


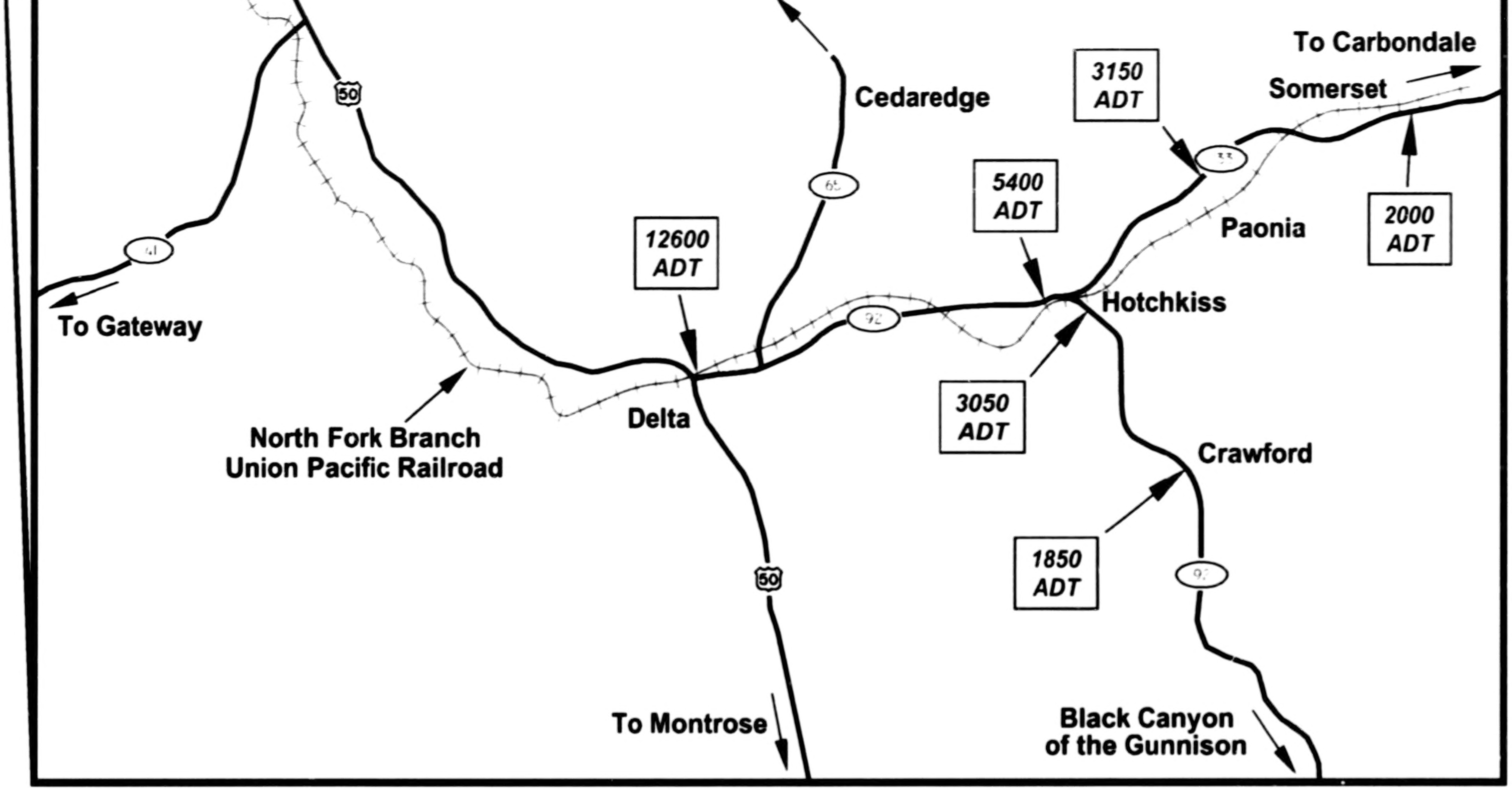
IMPACTS OF INCREASED COAL TRAINS

BEST COPY AVAILABLE

North Fork Coal DRAFT EIS
FIGURE 30
NOISE IMPACT DESCRIPTORS
USING FEDERAL TRANSIT ADMINISTRATION CRITERIA

COLORADO


COLORADO
To Glenwood Springs
70
70
Grand Junction
50
To Grand Mesa Lakes
Cedaredge
To Carbondale
Somerset
3150 ADT
5400 ADT
2000 ADT
12600 ADT
Paonia
Hotchkiss
65
92
To Gateway



Source: 1996 - Colorado Department of Transportation

EXPLANATION

ADT AVERAGE DAILY TRAFFIC

North Fork Coal DRAFT EIS

FIGURE 31

RAIL AND ROAD SYTEMS

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APPENDIX FIGURES

APPENDIX FIGURES

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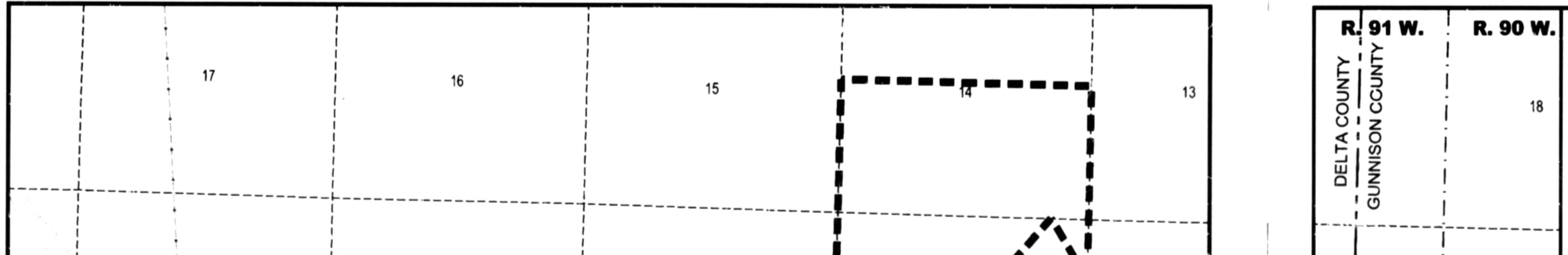

EXPLANATION

— PROPOSED COAL LEASE TRACT BOUNDARY LEASE BOUNDARY

- - - PROPOSED COAL EXPLORATION LICENSE BOUNDARY

■ No. 2 POWERLINE

▤ No. 3 COUNTY ROAD

● No. 11 RAPTOR NEST SITE

☐ No. 12 EAGLE CONCENTRATION AREA

NOTE:
(1). After applying the exceptions, all lands in lease tracts were suitable for mining with inclusion of appropriate restrictions. See Appendices C & D, Unsuitability Analyses for the Iron Point and Elk Creek Coal Lease Tracts.

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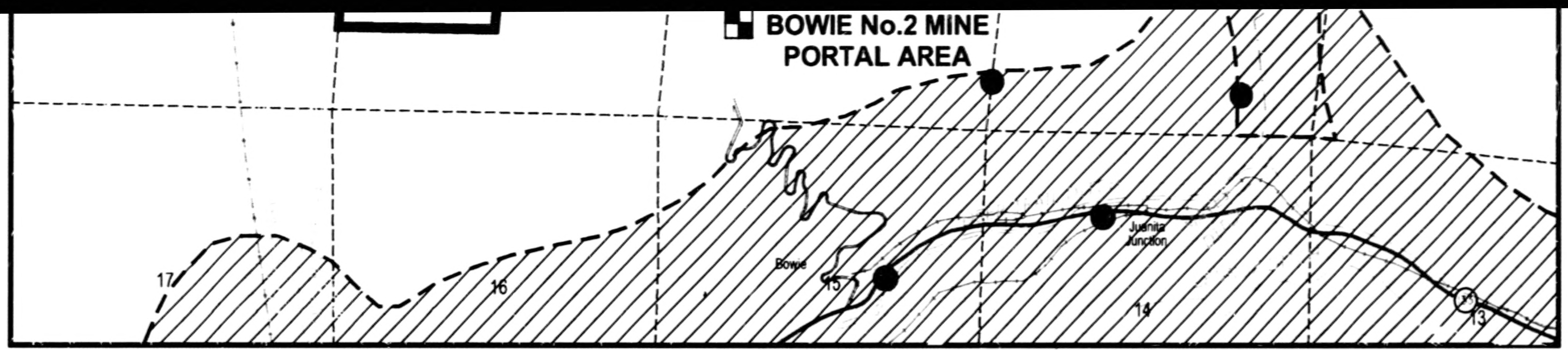
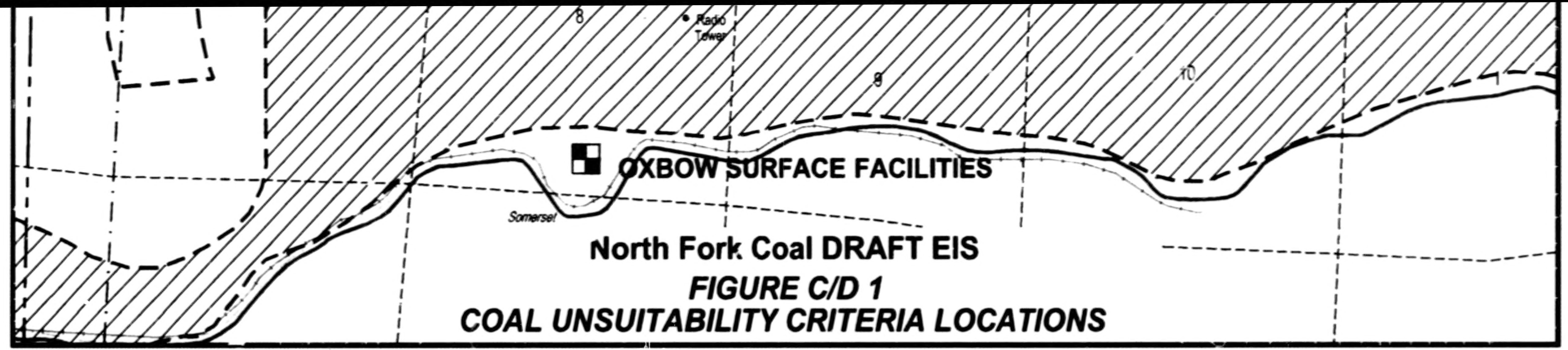
North Fork Coal DRAFT EIS

FIGURE C/D 1

COAL UNSUITABILITY CRITERIA LOCATIONS





North Fork Coal DRAFT EIS

FIGURE C/D 1

COAL UNSUITABILITY CRITERIA LOCATIONS

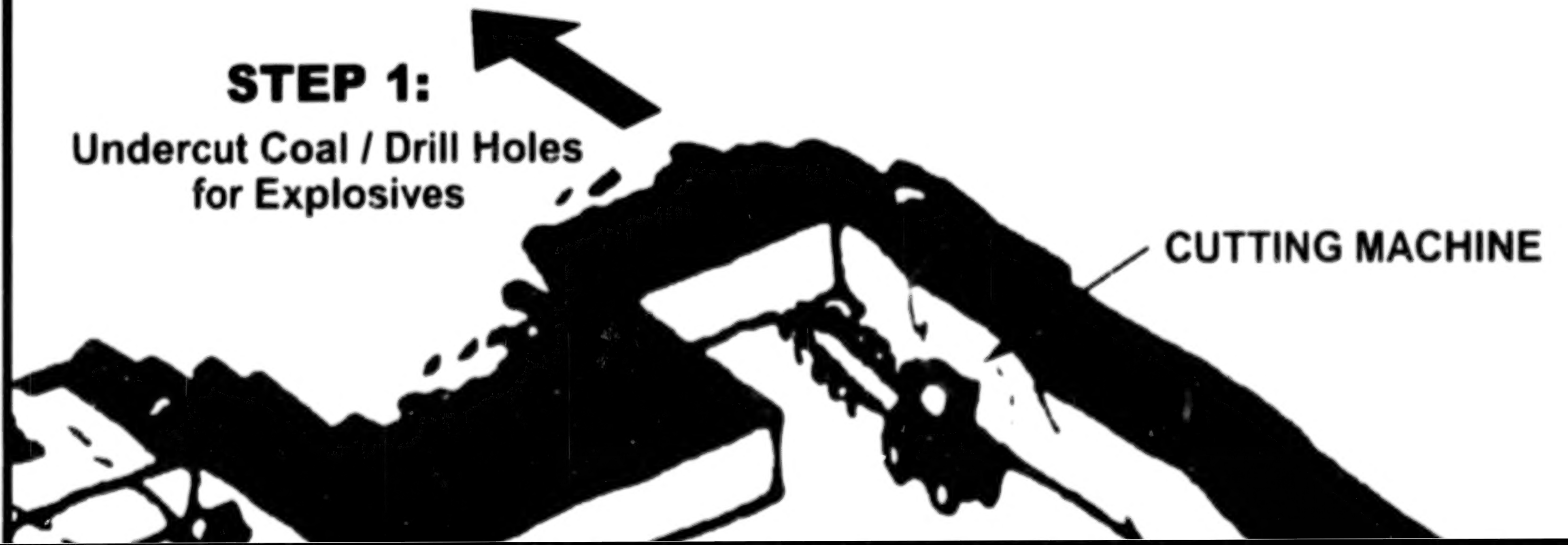
STEP 2:

Load Drill Holes
with Explosives

CONVENTIONAL
MINING
OPERATIONS

STEP 1:

Undercut Coal / Drill Holes
for Explosives



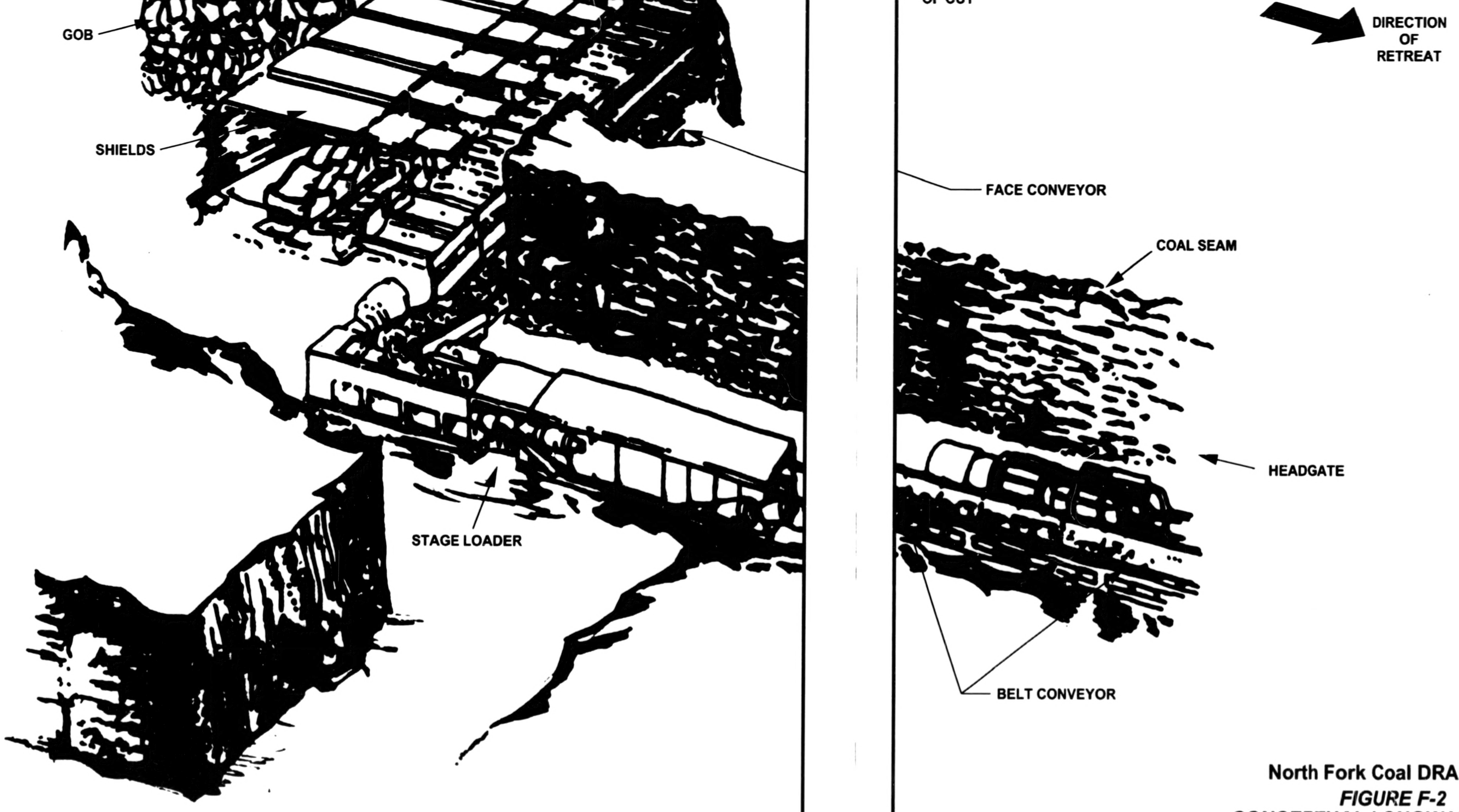
CONVENTIONAL MINING OPERATIONS
STEP 1:
Undercut Coal / Drill Holes for Explosives
CUTTING MACHINE
STEP 2:
Load Drill Holes with Explosives
STEP 3:
Blast
STEP 4:
Load Coal
STEP 5:
Roof Bolt
LOADING MACHINE
ROOF BOLTER MACHINE
SHUTTLE C
SHUTTLE CAR
CONVEYOR BELT

North Fork Coal DRAFT EIS

FIGURE F-1
CONCEPTUAL ROOM AND PILLAR MINING

CHAIN PILLARS

CHAIN PILLARS
DOUBLE - DRUM SHEARER
TAILGATE
DIRECTION OF CUT
DIRECTION OF RETREAT
GOB
SHIELDS
FACE CONVEYOR



North Fork Coal DRAFT EIS

FIGURE F-2
CONCEPTUAL LONGWALL MINING

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